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ORIGINAL MEMOIRS.

CONTRIBUTION TO THE SURGERY OF NEUROFIBROMA OF THE ACOUSTIC NERVE.[1]

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WITH REMARKS ON THE SURGICAL PROCEDURE.

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THE rapid advances made during recent years in our knowledge of the location of functions in the cerebral cortex and the function and course of various conduction paths within the brain have rendered possible the localization of a large number of brain tumors.

In some instances, especially when situated in the Rolandic area or at the base of the brain implicating cranial nerves, the location of the neoplasm may be indicated with great exactness; more often, however, only an approximate idea of its situation is possible.

An estimation of the size and character of the growth is nearly always a mere matter of speculation, based on tumor

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statistics, the rapidity of the clinical course, or associated constitutional conditions.

In tumors situated near the surface of the brain, a differentiation into cortical, subcortical, or supracortical is uncertain and often impossible. So that in the present state of our knowledge an operation for the relief of brain tumor when not palliative is essentially exploratory in nature.

The most encouraging results and brilliant successes attend the removal of cortical growths, especially those which do not infiltrate the brain substance and are easily enucleated.

So that, generally speaking, any group of tumors in which the localization, nature, approximate size, and enucleability could be asserted before operation, would be especially distinguished as favorable for surgical interference.

We believe that the class of tumors under consideration, the so-called acoustic neuroma, constitutes such a group, and therefore possesses surgical possibilities and importance.

The deep situation of the growth in the triangular space at the base of the brain, formed by the junction of the cerebellum, medulla, and pons, however, presents a serious obstacle, and renders any operative procedure difficult and dangerous.

The pathology, symptomatology, and diagnosis of these tumors have been discussed at length in a previous communication by the writers. (Tumors of the Ponto-medullo-cerebellar Space, *Medical Record,* December 26, 1903.)

In the present study, the surgical aspect will receive more especial consideration.

The acoustic neurofibroma is a firm nodular growth (a neurofibroma) springing from the acoustic nerve as it emerges from the junction of the pons and the medulla. Hence the initial and most important symptom is referable to a disturbed function of the auditory nerve. (Tinnitus aurium, Ménière's syndrome, and deafness.)

The proliferation of a neurofibroma is slow, and the conductibility of the nerve-fibres is maintained for a considerable time.

The anatomical features of the location of the tumor, a preformed excavation as it were, offer some possible explanation of the periods of latency observed.

At this stage a neoplasm of the auditory nerve might be suspected; a certain diagnosis would be impossible.

With the gradual proliferation and increase in size of the tumor, adjacent structures are pressed upon, and symptoms due to compression of the pons, medulla, cerebellum, and adjacent cranial nerves are added to the clinical picture. The general symptoms of brain tumor also become manifest.

At this stage the recognition of these tumors is possible.

The symptoms may be conveniently arranged in three groups:

1. General. Headache, vertigo, vomiting, optic neuritis, bradycardia.

2. Focal. Peduncular ataxia, cerebellar ataxia, lateropulsion, hemi-asynergy, homocontralateral and crossed paralyses of the extremities, paralysis of the basilar cranial nerves, especially the seventh, sixth, and fifth, dysarthria, dysphagia, nystagmus, paralysis of the conjoint movements of the eyes, inequality of the pupils, and attacks of Adams-Stokes syndrome.

3. Special. Serious impairment of the function of the auditory nerve of long standing and gradual onset.

Other pathological conditions in the posterior fossa of the skull might simulate this condition; but the initial auditory nerve symptoms, and the very gradual evolution of the clinical picture produced by a proliferation in the cerebellopontile angle, should render differentiation possible.

These tumors vary in size from a cherry to a bantam's egg. They are of fibrous structure, enveloped in a smooth capsule and present a nodular surface. They are loosely attached to the surface of the base of the brain by the leptomeninges, blood-vessels, atrophic nerve-trunks, and a few adhesions. So that enucleation is readily performed, leaving a smooth depression. Occasionally nodulations and thicken-

ings are said to extend along the auditory nerve to the internal auditory meatus. Rarely the acoustic tumor is bilateral, and other cranial nerves may be affected.

Regressive metamorphoses, hæmorrhagic areas, and sarcomatous transformation may occur, although the growth is essentially a benign one.

[FROM THE PATHOLOGICAL LABORATORY, CORNELL UNIVERSITY MEDICAL COLLEGE.]

CASE I, reported by Dr. Hunt.—The patient was admitted to Bellevue Hospital, April 23, 1903. Service of Dr. Alexander Lambert, by whose courtesy I was permitted to study and record the case.

Summary.—Onset and initial symptom six years before with tinnitus aurium and slowly progressive diminution of hearing in the left ear; two years later a tendency to stagger, occipital headaches, vertiginous seizures, and fainting spells. Up to the year previous to admission all the symptoms had gradually increased in severity. Marked disturbance of the gait and equilibrium. Deafness in the left ear. Severe occipital and frontal headaches, with vertigo. Failing vision. Symptoms on admission were cerebellar and peduncular ataxia, with a tendency to fall backward and to the left. Double optic neuritis. Lateral nystagmus. Dilated and unequal pupils. Dysarthria. Paræsthesia and objective sensory disturbances in the distribution of the left fifth nerve. Paresis of the left seventh with electrical changes. Nervous deafness in the left ear. Based on the duration and chronological relation of the symptoms, the clinical and pathological diagnosis of a neurofibroma of the left acoustic nerve was made.

Operation.—The occipital bone was trephined to the left of the median line below the lateral sinus. The opening was enlarged by the rongeur forceps in the direction of the foramen magnum. The dura mater and cerebellar hemisphere bulged into the opening and did not pulsate. The finger was passed along the inferior surface of the cerebellum to the tumor, which occupied the triangular space formed by the junction of the pons, medulla, and cerebellum. It was firm and nodular and easily detected by palpa-

tion. The growth was broken up and removed in fragments by digital manipulation. Death occurred twelve hours later from cardiac and respiratory failure.

Autopsy.—The left cerebellar hemisphere in the field of operation had suffered some laceration, but without serious hæmorrhage at the base. There was, however, a hæmorrhagic focus within the left middle peduncle of the pons, which had extended inward towards the median line and was the immediate cause of death. Histologically, the tumor was a neurofibroma.

History.—The patient was a Russian Jew, aged forty-two years, a pedler by occupation. His mother and one brother died of pulmonary tuberculosis. Six brothers and one sister are living and in good health. There is no family history of tumor or any grave mental or nervous affection. He is the father of three healthy children; no miscarriages. Habits are moderate; no venereal infection. Eight years ago he received a severe blow in the back of the head from a fist, followed by momentary unconsciousness; no apparent after effects.

When first admitted to Dr. Lambert's ward, the man had but recently been transferred from Mt. Sinai Hospital. He was very much excited and confused; could not be prevailed upon to remain in bed, but would fall out, staggering and dragging himself around the ward.

As the vision was very much impaired and he could scarcely stand, it was feared he might incur some injury, so that restraints were applied to the wrists and ankles. I saw him a few hours later. He was then crying out, jabbering in Yiddish and tugging on the restraints. On being questioned, he would cease his efforts for a moment, giving a fairly intelligible answer, but then, apparently unable to control himself, would begin to toss about again, yelling and moaning. The pupils were moderately dilated and unequal, the left wider than the right; light reactions sluggish. Speech was thick and indistinct. There was a distinct weakness of the left seventh nerve, especially marked in the upper branch. After the restraints had been removed the patient became quieter, answered a few questions, but was still very confused and irritable. He was unable to stand alone, but would plunge backward, quite unable to maintain his equilibrium. A more thorough examination was postponed until the following day.

An examination of the eye-grounds by Dr. Alexander Duane showed a double optic neuritis.

April 24, 1903. Status Præsens. Patient is quiet and rational. Complains of headaches, chiefly in the occipital region, but also in the forehead; marked vertigo. He can stand for a short period alone, but then loses his balance and falls backward and towards the left side. On attempting to walk, after taking a few steps, he plunges backward and towards the left. While the tendency to fall is always backward and usually to the left, it rarely happens that he falls towards the right side. This inclination of the body backward and towards the left was confirmed by many subsequent examinations.

The legs are held widely separated and handled awkwardly, suggesting the cerebellar gait. The left leg sometimes gives way under him; while the direction taken by the patient in walking is in a line towards the left, no spiral or turning movements were at any time observed.

The gross motor power of the extremities is well preserved, save a slight general weakness of the left arm, which is also moderately ataxic. There is no ataxia of the right arm or of the legs in the recumbent posture. The tendon jerks of the arms are normal. The knee-jerks are exaggerated, more especially the left. The Achilles jerks are active, and there is a slight, easily exhaustible pseudo-ankle clonus. There is no hypotonia. The skin reflexes are normal. No Babinsky phenomenon. There are no paræsthesias or objective sensory disturbances, save in the distribution of the left trigeminus nerve, which will be referred to later.

Percussion of the skull was negative both as to tenderness and sound. The pupils are unequal and dilated, the left wider than the right, reacting feebly to light and accommodation. A slow lateral nystagmus develops as the eyeballs approach the extreme positions. No difficulty in deglutition, phonation, or in mastication. There is a distinct dysarthria. The articulation is thick and indistinct, with a tendency to division of syllables.

Cranial Nerves. The sense of taste and smell is subjectively unimpaired. The sight is almost gone, can scarcely count fingers held in front of the eyes. Double optic neuritis. The ocular excursions are normal (three, four, and six nerves).

The motility of the muscles of mastication is normal, and there is no evident atrophy. There are, however, paræsthesias (numbness and prickling) in the distribution of the left trigeminus nerve. Over this same area sensation is impaired to touch and pain; distinct spots of analgesia are present. On electrical stimulation the difference in the sensibility of the two sides of the face is clearly marked. The corneal and conjunctival reflexes are absent on the left side, and the left half of the tongue is heavily coated in comparison with the right.

The seventh nerve is paretic on the left side and of the peripheral type. This weakness is especially noticeable in the upper branch.

Electrical. Galvanic and faradic currents applied to the trunk of the facial nerve show diminished reactions on the left side. The reaction is especially sluggish in the upper branch. Applied directly to the muscles prompt reactions are elicited, of normal character, without reversal of the poles. The muscles supplied by the upper branch, however, show a quantitative increase.

Hearing is almost lost in the left ear. A watch-tick or a low voice is not heard. The vibrations of the tuning-fork are still faintly perceptible to aërial conduction on the left side. Applied to the vertex, they are referred to the right ear, although the patient also thinks he hears them faintly on the left.

The soft palate and tongue show no abnormalities of motility and no atrophy. Pulse and respirations are normal. The examination of the internal organs was negative. Urine normal.

The condition as outlined by this examination remained practically the same up to the time of operation. Variable headaches continued from time to time, not very severe, and located chiefly in the back and front of the head; also vertigo; no vomiting. At times the gait and station showed a slight improvement, so that the length of the ward could be traversed alone; but the tendency to fall backward and towards the left side persisted.

Mentally he was quite clear, although the memory appeared slightly defective, as evidenced by conflicting statements. There was none of the dulness or apathy so common in cerebral tumors.

From the general and focal symptoms just detailed, there could be no question as to the existence of a tumor in the posterior fossa of the skull, in the neighborhood of the cerebellopontile angle, encroaching on the neighboring cranial nerves.

The early and distinct involvement of the acoustic nerve suggested the existence of a neurofibroma of the acoustic. In the diagnosis of this condition, reliance is to be placed chiefly in the initial involvement of the auditory nerve and the chronological relation of the other symptoms.

The following facts were elicited with great care from the patient and were confirmed or corrected by the members of his family.

1. Six years ago he first noticed a diminution of hearing in the left ear. This had been preceded and was accompanied by tinnitus aurium, described as a roaring, whistling, buzzing, and sound of bells.

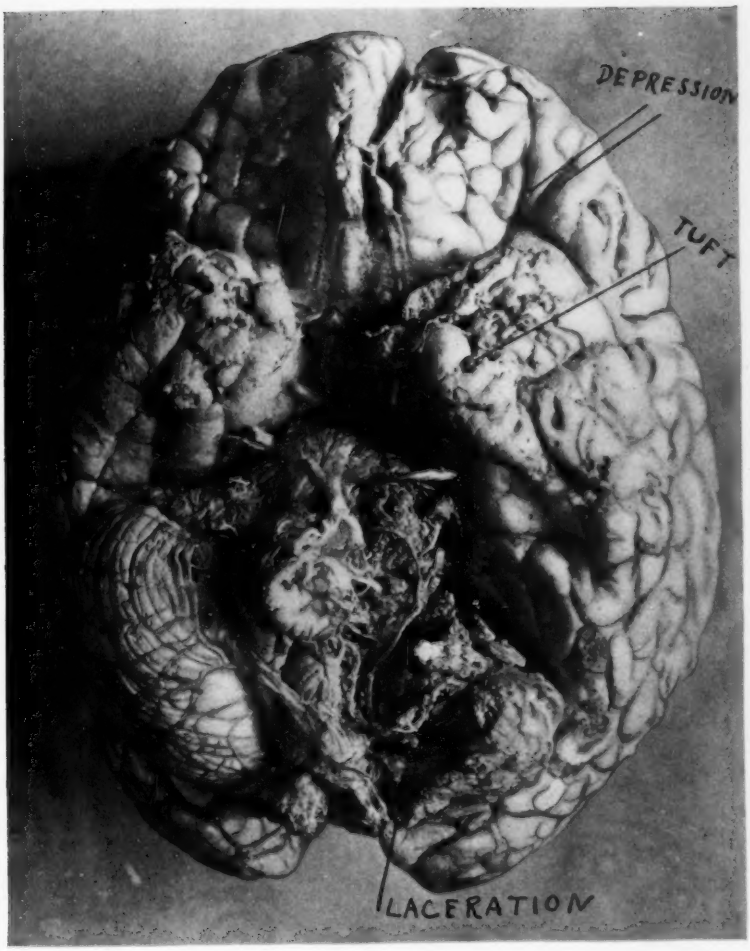
2. Two years later, in addition to the auditory symptoms, there developed a slight unsteadiness and awkwardness in the gait. The staggering at times was so pronounced as to be a source of embarrassment to the patient, giving the impression of being intoxicated. Vertiginous seizures were not uncommon, and headaches, chiefly in the occipital region, appeared about the same time. He had also occasional fainting spells with transient loss of consciousness.

3. During the last year all the above-mentioned symptoms had increased in severity. Headaches became severe and frequent with violent vertiginous seizures. The gait became staggering and uncertain and vision commenced to fail.

4. During the three months before coming under our observation locomotion had become more and more difficult, until walking or standing became an extremely precarious procedure, from the tendency to plunge backward. The dimness of vision passed into complete amaurosis.

(The paræsthesia and weakness of the left side of the face had caused the patient little or no inconvenience, and had practically escaped notice, so that the date of their appearance could not be ascertained with certainty.)

The clinical and pathological diagnosis of a neurofibroma of the left acoustic nerve was made, and the patient was transferred to the surgical ward for operation. The operation was performed, May 7, 1904, by Dr. George Woolsey. Immediately after the extirpation of the tumor, the breathing became irregular in depth and frequency, with alarmingly long intervals, and the pulse small, thready, and very rapid.



CASE I, FIG. 1.—Site of operation showing laceration of the cerebellum. Minute tufts and depressions in the cerebral cortex.

At 5 P.M., three hours after operation, the temperature was 102° F.; pulse, 112; respirations, 26.

At 9 P.M., temperature was 102⁴/₅° F.; pulse, 160; respirations, 40.

At 11 P.M., temperature was 102° F.; pulse, 140; respirations, 36.

At 1 A.M., temperature was 101° F.; pulse, 180; respirations, 44.

Death occurred at 1.30 A.M., twelve hours after operation, from cardiac and respiratory failure. The patient not having regained consciousness. Clonic spasms of the left side of the face were noticed. No convulsions.

Autopsy and Histological Examination.—The autopsy was performed thirty-six hours after death. Permission to examine the brain only, could be obtained.

On removing the calvarium, the outer surface of the dura mater was found studded with numerous minute tufts and excrescences, resembling somewhat the Pacchionian bodies, only more numerous and more widely distributed. As the dura was turned back, many of these were found attached to the cerebral cortex and were torn away, leaving at their point of attachment minute punched-out depressions on the surface of the convolution. From the base of many of these depressions soft, fungoid-like tufts project, apparently having no connection with the dura. These minute herniæ of brain substance, varying in size from a pin's head to a split pea, were distributed chiefly over the temporal and parieto-Rolandic regions, also sparsely over the frontal and occipital lobes.

These tufts microscopically are composed of glia cells and medullated nerve-fibres, without signs of inflammatory reaction, and represent real protrusions of brain substance.

The condition is to be regarded as of teratological origin.

The leptomeninges and circle of Willis are normal.

The Site of Operation (Fig. 1).—Corresponding to the original position of the tumor, there is a depression on the left side at the junction of the pons and the medulla. Excepting this pressure distortion, the brain stem presents no external evidences of injury. The inferior surface of the left lobe of the cerebellum has been lacerated. The laceration corresponding to the region traversed by the finger during the process of enucleation. Only two small fragments of tumor tissue remain, so that the extirpation has been practically complete. A few small, insignificant blood-clots were adherent to the torn surface of the

cerebellum, otherwise the base of the brain was free from hæmorrhage.

The roots of the seventh and eighth nerves were not demonstrable, and had evidently been torn away. The left fifth nerve is flattened out and compressed. The glosso-pharyngeal-vagus groups on the left side are somewhat matted together. The other cranial nerve-roots are normal, and in none are there evidences of a neurofibromatosis.

The vermis cerebelli was incised, and the right cerebellar hemisphere removed to expose the fourth ventricle. From the left side of the floor of the fourth ventricle there rises a rounded, dark-colored swelling covered by the smooth ventricular ependyma. This tumor-like projection from the floor of the ventricle corresponds to the field of operation on the basilar surface. On incision, it proved to be a hæmorrhagic infiltration in the middle peduncle of the pons, adjacent to the laceration in the cerebellar hemisphere and extending inward towards the râphe.

The aqueduct of Sylvius was not occluded by the swelling, and there is no free blood in the ventricular cavity. The general ventricular system of the brain is moderately dilated.

Microscopical Examination.—A series of sections was prepared from the various levels of the pons and medulla oblongata, including the lacerated portion of the left cerebellar hemisphere. The configuration of both pons and medulla has been altered by the compression of the tumor, the left half showing a considerable lateral flattening. There was no atrophy of the large tracts, sensory or motor, nor of the ascending roots of the glosso-pharyngeal and trigeminus nerves.

At the level of exit of the left fifth nerve there is a fresh hæmorrhagic focus in the middle peduncle of the pons, extending inward towards the median line. This hæmorrhage is immediately adjacent to the lacerated inferior surface of the left cerebellar hemisphere, which is also the seat of hæmorrhagic foci. (Fig. 2.)

A smaller effusion of blood is also present at the level of the acoustic nerve, standing in close proximity to the glosso-pharyngeal-vagus nuclei. (Fig. 3.)

Tumor.—The fragments of tumor removed at the operation showed the original growth *in situ* to have been about the size of a bantam's egg. The growth was of a soft, fibrous consistency and

CASE I.—Transverse Section of Pons.

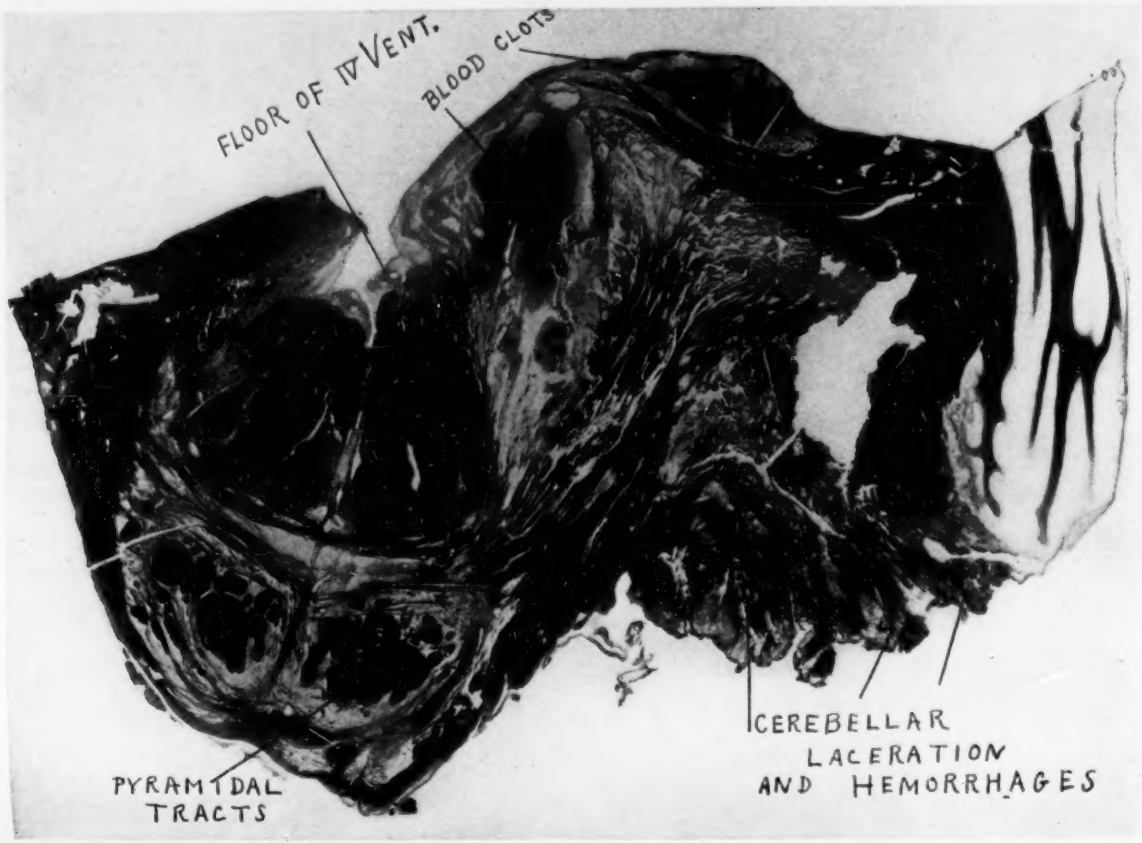


Fig. 2.—Weigert method. Section from the level of exit of the fifth nerve.
Laceration and hæmorrhages of the cerebellar hemisphere. Hæmorrhage in the left middle peduncle of the pons extending towards the median line.

CASE I.—TRANSVERSE SECTION OF MEDULLA.

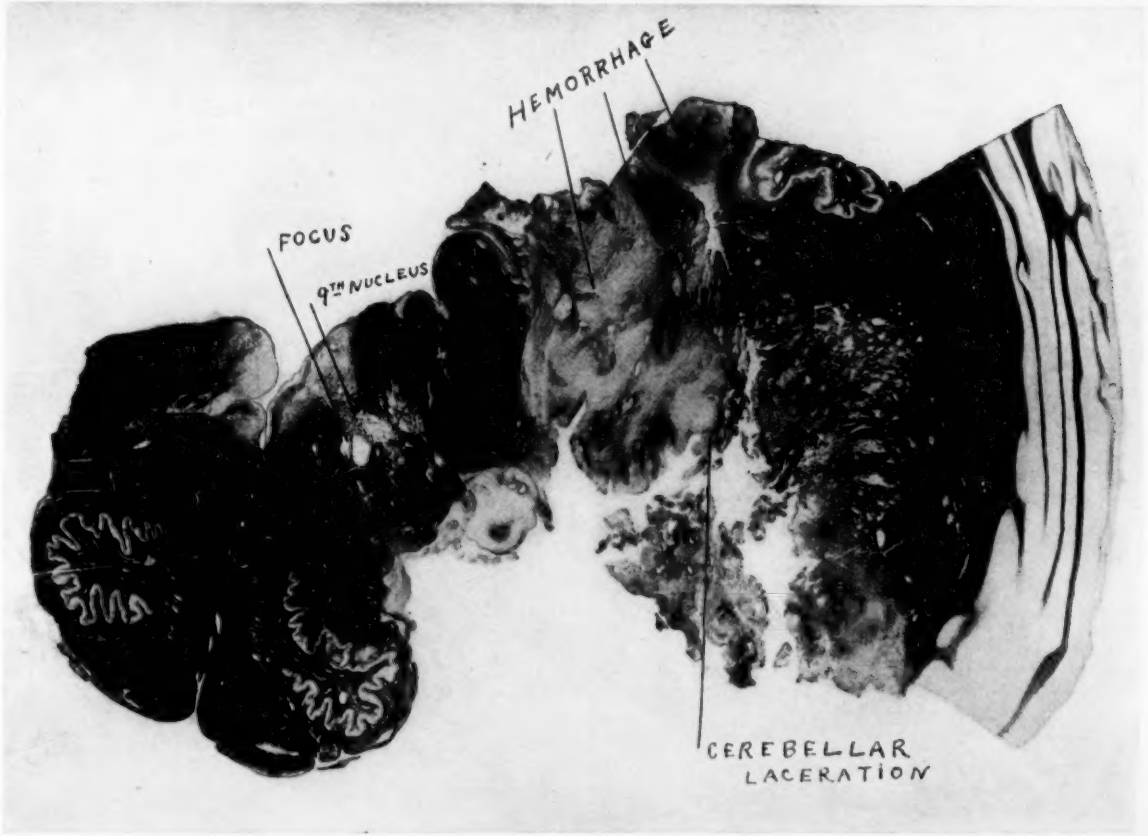


FIG. 3.—Weigert method. Line of the glosso-pharyngeal-vagus nuclei, showing hæmorrhage and laceration of the cerebellar hemisphere and a focus of hæmorrhage below the ninth and tenth nuclei.

somewhat nodular conformation, and was easily broken up between the fingers. The surface of section is of a gray, translucent, or pearly white tint with a few hæmorrhagic foci and areas of retrograde metamorphosis.

Histologically, the neoplasm is a neurofibroma. Medullated nerve-fibres were demonstrable within the substance of the growth by the Weigert method. There are no evidences of sarcomatous transformation.

DESCRIPTION OF THE OPERATIVE PROCEDURE IN CASE I BY DR. GEORGE WOOLSEY.

At the time of operating on this case, the writer was not aware that any operation on similar cases had been reported which might serve as a guide in this case.

In this, the first operation undertaken on a tumor of this kind, correctly diagnosed and localized, the problem presented was to remove a readily enucleable tumor in the pontomedullary angle, probably not directly connected with the brain. It seemed possible to accomplish this through a posterolateral opening, as large as possible, below the lateral sinus, through which the tumor could be reached beneath the cerebellar hemisphere.

Accordingly, a large flap of skin and underlying muscles, with its base inferiorly and laterally, was turned down, exposing the lower part of the left half of the squamous portion of the occipital bone and the posterior part of the left mastoid. The occipital bone was bared very nearly to the foramen magnum. After removing a button of bone with a trephine, the opening was enlarged as rapidly as possible with rongeur. The opening was thus made to extend from a little below the lateral sinus to a point close to the foramen magnum, and from a little to the left of the occipital crest laterally until the bone became so thick that its removal was slow and difficult. This brought it close to the sigmoid sinus.

The dura was tense and showed no pulsation. On opening the dura and turning it up as a flap, the left cerebellar hemisphere bulged considerably. The forefinger inserted beneath

this hemisphere in a forward and inward direction easily made out the tumor in the position diagnosed and at a distance from the opening in the bone, easily admitting the manipulation necessary for enucleation and removal. The tumor felt nodular and hard, and could be easily distinguished from the surrounding brain tissue. Its size was greater than was expected, and it was not thought feasible at the time to remove it entire. Hence it was removed piecemeal by the finger, which was done without much difficulty. This necessitated the frequent introduction and removal of the finger, and in the removal there was the extra bulk of the fragment of the tumor held by bending the end of the finger. This necessarily resulted in some laceration of the under surface of the left cerebellar hemisphere.

In order to avoid the accumulation of a blood-clot and its infiltration into or around the brain, a large cigarette drain was introduced to the situation of the tumor, along the tract followed by the finger. There was but little bleeding during the operation. The skin flap was sutured, leaving an opening for the passage of the drain. The operation was completed within an hour and a half.

It was not thought necessary to adopt Horsley's suggestion to operate in two stages, for during the stage of approach but little blood was lost, and at its completion the patient's condition was as good as at the commencement of the operation.

During the removal of the tumor the respiration became irregular in rhythm and depth. When the patient was returned to bed after operation, this had much improved, and the pulse had responded to stimulation and was quite satisfactory. This condition continued for three or more hours, and then the patient went into collapse, which did not yield to any method of stimulation.

The autopsy showed that death was due to hæmorrhage within the left middle peduncle of the pons. The writer was convinced that this was due to the traumatism indispensable

to the frequent introduction and withdrawal of the finger, especially as in withdrawing the finger it had to be bent at the end to remove the fragments of the tumor. The enucleation and breaking up of the tumor were easily done; the traumatism was inflicted in withdrawing the finger with the tumor fragment. This traumatism could be minimized by passing a curved vulsellum along the finger and seizing the tumor, enucleating it with the finger, and then withdrawing it *en masse* after removal of the finger. That this course was not followed was owing to the size of the tumor, which was larger than expected; but in spite of this, the writer is now convinced that it could have been safely done and the fatal injury to the pons probably avoided. Some laceration of the inferior surface of the left cerebellar hemisphere was anticipated, but this laceration is unimportant, and some of this part of the cerebellum could have been excised with impunity to facilitate the extraction of the tumor. The writer is satisfied that removal of such tumors by the route employed is feasible and can be successfully accomplished, especially if the tumor is somewhat smaller.

The route followed was not directly from behind forward, but from a posterolateral opening forward and inward. From the position of this opening, the route to the pontomedullary angle is about as short as any from the cranial surface, for the opening extended very close to the foramen magnum; but of course the enucleation and removal have to be done by the sense of touch alone.

The disadvantage of the approach from a more lateral position lies in the thickness of the bone here and the longer time and greater loss of blood necessitated in making the requisite opening. This objection can be obviated in some measure by doing the operation in two stages, as undertaken in Dr. Elsberg's operation in a subsequent case.

The exposure of the tumor and the field of operation claimed for this more lateral approach are also a distinct advantage. It is an open question, however, whether this advantage exists in practice, for the increased intracranial pressure causes such a bulging in every possible direction that the con-

ditions are far different from what they are postmortem or on the cadaver.

In view of the above considerations and the definite localization and easy enucleation of such tumors, the writer is convinced that their surgical removal is feasible, and that its successful performance may be expected in a fair proportion of cases, especially if they are diagnosed and operated upon as early as possible, before they have attained a large size.

CASE II, reported by Dr. Fraenkel. *Summary.*—Male, forty-eight years old. Disease began five years ago, with progressive diminution of hearing on right side. One year later, difficulty of locomotion. Right lower extremity affected first. One year later, increase of locomotor difficulty; gait of drunken man. Transient diplopia and propulsion. Two years ago noticed the occurrence of an ankle clonus. Since two years, impairment of vision and difficulty of speech. Ataxia. Since one years, sphincteric difficulties.

On examination, static and locomotor ataxia; falls and inclines to left side; tenderness in right mastoid region; some mental apathy; stammering speech; bilateral choked disk; nystagmus; paralysis of right side of face (developed four months after admission); motor paresis and spasticity of left-sided extremities; some spasticity of right side and marked right-sided ataxia.

Preparatory operation, January 21, 1904, by Dr. C. A. Elsberg. Patient died forty-eight hours after operation.

A. G., forty-eight years old; single; theatre manager; born in United States; was admitted to the Montefiore Home, July 21, 1903.

Family History. Father died at sixty-two from Bright's disease. Mother living, seventy-eight years old. One brother died at age of seven, and imbecile; a paternal cousin died insane.

Personal History. Born naturally; was the third child; began to walk at proper time; had measles and scarlet fever. Nutrition was good in childhood; no rhachitis. Went to work as office boy at fifteen for four years. Later was a retail butcher and was in remarkably good physical condition. After six years

went on the road as theatrical manager and travelled all over the country. Always lived comfortably; had sufficient hours of rest; drank liberally of beer, whiskey, and champagne. Inveterate smoker. Gonorrhœa six years ago. Epididymitis. Syphilis denied. Bowels regular up to seven years ago, when tendency to costiveness developed.

Present Disease.—About five years ago he noticed that hearing became defective on right side; had to use left ear when telephoning. One year later gait became staggering; he had to walk on a broader basis, felt somewhat uncertain, swayed slightly. Within six months this difficulty increased markedly; the gait assumed the distinct characters of a "marche d'ivresse," so that he frequently was believed to be intoxicated. About the same time diplopia occasionally put in an appearance. One-half year later the co-ordination of the lower extremities became still worse, and was particularly annoying when he had to walk on inclined surfaces. Under such conditions he had a marked propulsion, could not stop himself, frequently ran into cars. Since about two and one-half years, patient noticed that his feet began to "beat a tattoo" when in certain positions, sometimes both feet, more often the right. Since about fourteen months is confined to bed or chair. Since about two years progressive impairment of vision; speech and handwriting are also impaired since. Pronunciation has become difficullt and patient is unable to write on a given line. During this time he also noticed progressive loss of co-ordinatory power of his hands (unable to button shoes, feed himself neatly, etc.). "Cannot judge distances when reaching for articles, has lost confidence in his movements."

The patient is mentally fatigued by reading or any other effort, gave up all work since two and a half years. During the last year had frequently vesical incontinence, and could not restrain the flow when the desire came. Similar disturbances of the rectal musculature have occasionally occurred. Never had pain, paræsthesias, girdle sensation, or vomiting. Headache occasional on top or back.

Present Complaints (July 25, 1903). Patient weighs 140 pounds; of good nutrition; rather short stature; stands for a short while with feet widely apart; marked titubation; inclines and falls towards the left side; complexion is sallow and subicteric; no scars on skin, no glandular enlargement; a few pig-

mented and vascular moles; regional varicosities of veins; no other dermal abnormalities.

Circumference of head, fifty-two centimetres; brachycephalic; auscultatory percussion of skull is negative; marked tenderness in right mastoid region; slight mental hebetude, speech hesitating, syllabic.

Face. Lines well marked, innervation equal.

Eyes. Position normal; on lateral movements, horizontal nystagmus; on vertical movements and during fixation of eyeballs, rotatory nystagmus; slight clonic twitchings of right lower lid; palpebral reflex diminished; pupils equal, regular; all reactions present. No limitation of visual fields.

Ophthalmoscopic Examination by Dr. E. S. Peck.

August 5, 1903. O. D. Optic nerve can be traced under a papillitis surrounded by a complete perioptic effusion. Retinal veins are tortuous in all directions. The upper outer retinal vein is lost just outside disk, as if buried under effusion.

O. S. Condition of optic nerve same, with smaller amount of perioptic effusion.

August 8. O. D. V, $^{12}/_{100}$. O. S. V, $^{12}/_{40}$.

O. D. Peripheral V good in all directions, except above; vision above is lost down to 40.

O. S. Field of vision good in all directions, in fact, almost perfect.

O. D. Above and to temporal side of optic nerve can be counted six small spots of hæmorrhage seen through the effusion, already noted.

O. S. Three or four hæmorrhagic spots can be counted in close proximity to optic nerve.

September 9. O. D. Contour of optic nerve clearer, hæmorrhages apparently diminished.

O. S. ditto.

September 10. Examination by Dr. Karl Koller. Neuritis; optic nerve not well defined and congested (difficult in undilated pupils). Disks not well defined and retina not participating.

Ears. Normal size and shape; hearing on right side very much diminished.

Examination by Dr. Felix Cohn. Without tuning-forks, evidences of probable acoustic nerve involvement on right side. Hearing appears to be not absolutely lost.

Tongue is large, broad, not coated; protruded, straight. Sublingual veins are large and varicose. Motility of pharynx normal; uvula is long, has a beaded appearance, deviates slightly to the right side; pharyngeal reflexes very diminished. Clonic twitchings of right platysma myoides. Varicosities along the right jugular vein.

Motor functions of chest and abdomen normal; cremasteric reflexes absent; the other skin reflexes present and normal.

Upper Extremities. Volume equal and good; no deformities or atrophies. No tremors when at rest. Marked coarse, intentional tremor of upper extremities. Tendon reflexes exaggerated.

Lower Extremities. Good volume; some loss of power, more on left than on right side. Hypertonia not marked. Knee and Achilles jerks exaggerated; more marked on left. Plantar reflex; Babinsky type on left side, normal on right side. Coarse tremor of right vastus internus and gluteus maximus muscles. Sensory functions normal; some loss of deep sensibility of right upper extremity.

Thoracic and abdominal viscera normal. Pulse 72, of normal qualities; urine normal.

Decursus Morbi.—August 7, 1903. Slight frontal headache on right side; twitchings of right-sided muscles of neck.

August 18. Rectal incontinence.

August 23. Awoke with severe headache; few hours later lost consciousness; fell out of chair.

August 25. Patient is somewhat confused and wandering.

September 3. Last three days and two nights attacks of singultus.

September 27. Complains about frequent headache and increased salivation.

December 3. Attack of vertigo; loss of consciousness.

December 12. Slight transient right-sided lagophthalmus.

January 4, 1904. Mental condition slow; patient is easily confused; conjunctival and corneal reflexes of right side absent; incomplete paralysis of right seventh; marked clonic twitchings in upper and middle branches of this nerve. Deficient innervation of right half of soft palate; marked ataxia of left upper extremity; marked spastic paresis of right-sided extremities.

Examination of Sense of Taste gave the following result:

Right.	Syr. Simpl.	Chin. Sulph.	Acid Tartar.	Ol. Citr.
Anterior one-third of tongue,	not perceived,	salty,	acid,	lemon.
Middle one-third of tongue,	.....	.....	.....	.....
Posterior one-third of tongue,	sweet (delayed),	salty,	acid,	lemon.
Left.				
Anterior one-third of tongue,	not perceived,	not perceived,	not perceived,	not perceived.
Middle one-third of tongue,	.....	.....	.....	.....
Posterior one-third of tongue,	sweet,	salty,	acid,	lemon.

Sensation of touch impaired in left anterior one-third of tongue.

Pain sensation delayed in same area.

The electrical examination showed quantitative diminution of the excitability of the right facial nerve.

January 7, 1904. Very marked tenderness of right mastoid region; marked total paralysis of right side of face; characteristics of a peripheral lesion. Occasional clonic twitchings of musculature of right side of face; marked loss of kinesthetic sensibility of left upper extremity. Abdominal and cremasteric reflexes absent on both sides.

The diagnosis of neurofibroma of the acoustic was the only one possible to reach. In view of the fact that the optic neuritis has not reached a stage incompatible with the expectation of improvement, operation was advised. Patient and his family were informed of the dangerous nature of the procedure.

Preliminary craniotomy was performed by Dr. C. A. Elsberg, January 21, 1904.

Only the first step of the operation was performed; patient died forty-eight hours after the operation, apparently in uræmic coma. The post-mortem inspection demonstrated the tumor in expected locality and of expected nature (neurofibroma). (Figs. 4 and 5.)

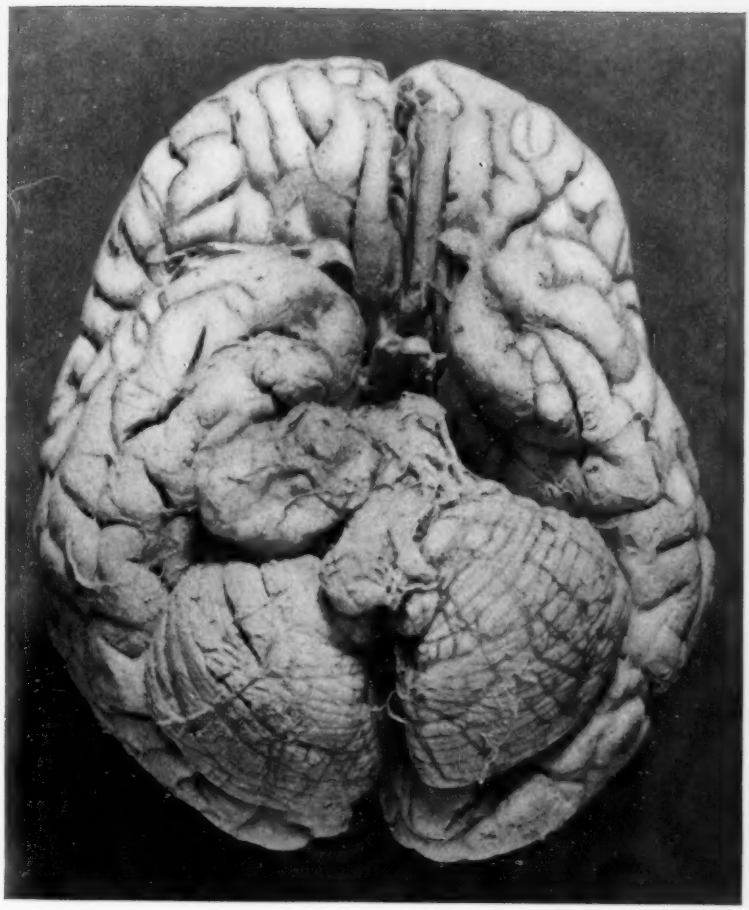


FIG. 4.—Showing tumor in situ.

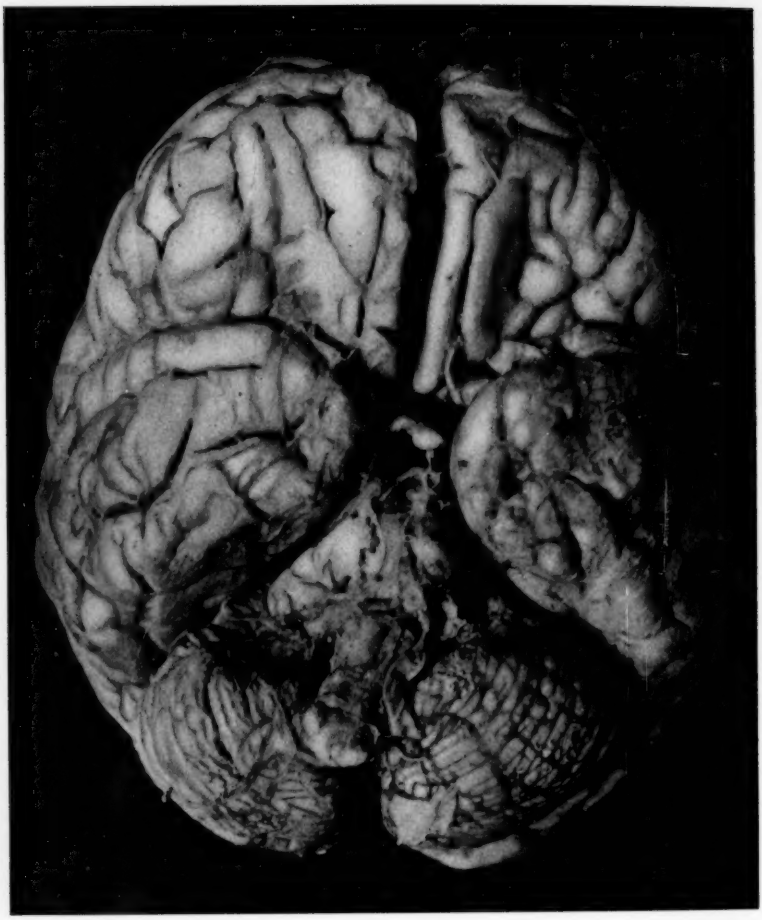


FIG. 5.—Showing depression after removal of tumor.

REMARKS ON THE OPERATION IN CASE BY DR. C. A. ELSBERG.

Incision beginning at the apex of the mastoid process on the right side, running upward to the level of the superior curved line of the occipital bone, then curving outward and then downward about four centimetres from the median line of the neck to end at the level of the beginning of the incision. This skin flap, including the periosteum, was turned down after the bleeding from the soft parts, which was quite active, had been stopped. In the middle of the area of bone thus exposed, a small button of bone about three centimetres in diameter was removed with the cranial drill, and with chisel and cranial rongeur the opening was enlarged in all directions. The lateral sinus was exposed over a distance of five centimetres in its horizontal course, as well as the entire descending loop down to the point where the sinus enters the jugular foramen. The removal of the bone occupied considerable time, as the skull was very thick. The opening in the bone measured about eight centimetres in its vertical and five centimetres in its horizontal diameter, and extended from about two centimetres above the level of the superior curved line of the occipital bone down to within one and three-fourths centimetres of the margin of the foramen magnum, and laterally from within one centimetre of the external auditory meatus outward for five centimetres to three centimetres of the median line.

In the upper part of the wound the posterior surface of the right occipital lobe covered by dura mater was visible, and in the lower part, the outer portion of the posterior surface of the right lobe of the cerebellum covered by its dura. The cerebellum bulged more than normal, and its pulsation was only very feeble.

After some oozing from the bone had been stopped with bone wax, the skin flap was turned back into place, and the entire wound closed with interrupted silk sutures, a small rubber drain having been inserted in the lowermost wound angle. A voluminous dry dressing was then applied.

Operation. Quantity of blood lost during operation (estimated), ten ounces. Condition of patient at conclusion of operation, fair; considerable shock; pulse, 120 and compressible; respirations, regular and deep.

Remarks. The patient did not stand the operative interference well, as his pulse became weak as soon as the incision in the soft parts of the scalp had been made.

The scalp was very vascular, but the bleeding was readily controlled. The hæmorrhage from the bone came from a vein in the mastoid process, but it was readily controlled and stopped with a small quantity of Horsley's bone wax.

At no time during the operation was any interference with the respiration observed.

Clinical Course after the Operation. The patient seemed to be in a condition of considerable shock when first returned to his bed. His respirations were slow and deep; his pupils contracted and equal; temperature, 100.6° F.

Within one hour of the operation, twitchings were noticed in the paralyzed facial nerve, its lowermost branches, and within two hours there was some voluntary movement in some of the branches of the nerve.

The patient was partly conscious in three hours and fully conscious in about eight hours.

During the first twenty-four hours the patient was energetically stimulated, and his general condition improved very much. He was fully conscious; did not complain of much pain; his respiration was very regular; his pulse was 120, and of fairly good quality. He had passed very little urine, however, and was therefore given subcutaneous infusions of normal saline solution at frequent intervals.

In spite of energetic treatment, his kidneys would not respond, and less than one-half ounce of urine was secreted during the following twelve hours. He gradually went into the uræmic condition, became comatose, and died on the morning of January 23, about forty-two hours after the operation.

Post-mortem Examination of the Wound. The skin flap

was turned down after the skin sutures had been divided, the wound looked clean, and there was but little secretion. The dura was incised along a line about three millimetres away from the sinus for a distance of about five centimetres, and the lateral part of the cerebellum thus exposed. Palpation with the finger at once revealed the tumor only three centimetres from the surface and lying in the posterior fossa near the apex of the petrous portion of the temporal bone. Its removal could probably have been accomplished with ease and with considerable rapidity.

The opening in the skull in our patient was made in a rather unusual situation, and it may therefore not be out of place to state briefly the reasons for the method here employed.

In most of the operations for a tumor in the posterior fossa, the cerebellum has been exposed by the so-called occipital craniotomy, in which an opening is made in the occipital bone somewhere between the median line and the posterior margin of the mastoid, and below the level of the lateral sinus. For tumors situated in front of the cerebellum, as was the tumor in our case, and for tumors in the anterior and lateral parts of the cerebellum, there are several objections to this method of exposure:

1. It is not the shortest route from the surface of the skull.

2. The manipulations in the removal of the tumor have to be done by the sense of touch alone.

3. Even with the most gentle manipulations, the cerebellum is apt to be considerably contused and its tissues injured.

4. In the digital examination of the anterior parts of the cerebellum from the under surface of the organ, the finger must come in frequent contact with the medulla and perhaps the pons; the great danger from only slight injuries to these structures is well known.

My object in investigating this subject was, if possible, to find a method by which the disadvantages above mentioned would be avoided.

As to 1. Actual measurements on a number of skulls showed that the shortest distance from the surface of the skull to the anterior edge of the lateral lobe of the cerebellum on the same side is measured on a line which runs along the posterior surface of the petrous portion of the temporal bone, and reaches the surface of the mastoid, one to two centimetres behind the external auditory meatus. The distance from the outer surface of the occipital bone below the level of the lateral sinus to the anterior edge of the cerebellum diminishes steadily as one makes measurements more and more distant from the median line. These facts show that the shortest route to the pontomedullary cerebellar space to the internal auditory opening in the mastoid process.

As to 2. If in the cadaver, an opening in the skull is made in the mastoid region and the dura incised, the lateral edge of the lateral lobe of the cerebellum falls away from the posterior surface of the petrous portion of the temporal bone, so that fully one-half of this part of the bone can be seen. With only very slight retraction, the lateral lobe can be drawn sufficiently towards the median line, so that the auditory and facial nerves can be plainly seen in their course from the pontomedullary cerebellar space to the internal auditory meatus and even the ninth, tenth, and eleventh cranial nerves can be seen in part of their course in the posterior fossa. The auditory nerve can be cut close to its origin with a fine scissors without touching the pons or medulla. I have performed the operation on the cadaver three times, and have become convinced of its feasibility. In the living body, where the cerebellum is filled with blood, the same conditions will be found, although to a somewhat less degree. This has been demonstrated by Krause, of Berlin, in a somewhat similar operation devised by him for a case in which he cut the auditory nerve in the posterior fossa for the relief of a persistent tinnitus aurium.

As to 3. As is well known, considerable of the lateral parts of the cerebellum can be cut away without causing a

permanent disturbance in the functions of this part of the brain. Therefore, this is the part of the cerebellum that can be handled with the greatest safety. As has been already mentioned, this is the part of the cerebellum that can be most easily retracted. From all of these facts, it must follow that the approach to the anterior edge of the cerebellum along its outer edge is not only the easiest, but also the route in which the organ is least apt to be injured during the necessary manipulations. Attention may again be called to the fact that with only very slight retraction of the lateral edge of the lateral lobe of the cerebellum, the greater portion of the posterior surface of the petrous portion of the temporal bone (which forms in that situation the anterior boundary of the posterior fossa) becomes visible.

As to 4. An examination into the anatomical relations of the structures in the posterior fossa will soon make it clear that when the pontomedullary cerebellar space is approached from the mastoid region along the outer edge of the lateral lobe of the cerebellum, neither finger nor instrument need come in intimate contact with the pons or medulla, until the space itself has been reached. It is probable that the correct way to remove tumors from this region is to expose the structures on the mesial side of the tumor, if possible, and to divide these first, and then to work outward all of the time away from the pons and medulla. In this way the danger of injury to these important structures is reduced to a minimum.

The writer believes that operations for tumors of the brain should always be done in two stages, and in the case here reported the first stage consisted only of the making of the necessary opening in the skull. Unfortunately, the patient succumbed to an acute suppression of urine on the third day after the operation, at a time when he appeared to have recovered from the shock of the operative interference.

GENERAL CONCLUSIONS.

1. We believe that the acoustic tumor syndrome is well defined, and that the diagnosis can be made with practical cer-

tainty. This presupposes not only the diagnosis of the location of the tumor, but its nature and comparative size. It must, however, be observed that other slowly growing pathological conditions in the posterior fossa might simulate closely this condition.

2. The slow and essentially benign nature of the growth, its non-infiltrating character and enucleability would all favor surgical interference.

3. The deep situation at the base in immediate proximity to vital centres offers *very serious obstacles.*

4. From personal observation, we believe that the surgical technique should be perfected along the following lines:

a. The avoidance of undue concussion in the removal of the bone and enlargement of trephine opening.

b. A method of extirpation by which the tumor could be extirpated without undue manipulation of the surrounding parts.

c. The division into stages, as recommended by Horsley, and celerity of execution.

5. The study of the literature of this subject is unsatisfactory because most of the cases are recorded under the heading of cerebellar tumors. We succeeded in collecting from the literature six other cases which presented the clinical and pathological characteristics of the acoustic neuroma. An abstract of these cases is appended below.

CASE I.—MCBURNEY & STARR. *American Journal of the Medical Sciences,* 1893, page 377. *Fibrosarcoma of cerebellum and pons varoli. Operation; death.* Male, aged thirty years, presented general symptoms of tumor during a period of three years. For the past year diplopia; speech slow and thick. Numbness of left side of face; tinnitus aurium.

Status.—Left external strabismus; nystagmus; choked disk; slowness of speech; hebetude and great mental apathy; progression of symptoms; optic atrophy; complete deafness in left ear with staggering gait; marked tendency to fall forward and towards right side; weakness of right hand; knee-jerk exaggerated on right side, ankle clonus on right.

Operation.—Soft parts turned back over occipital region. Opening in left occipital bone with chisel and mallet, one and a half inches in diameter; marked bulging of dura incised; protrusion of cerebellar tissue; exploration made in all directions with index-finger without locating

tumor. Considerable laceration of cerebral tissue as result of manipulation. It was impossible to replace the prolapse. Excess shaved off. Wound healed by primary intention. Aseptic throughout. Patient died December 15; temperature, 105° F.

Autopsy showed gliosarcoma; left hemisphere of cerebellum, one-half pons and one crus slightly indented by tumor; one auditory and facial and fifth implicated in tumor.

CASE II.—G. A. GIBSON. *Edinburgh Medical Journal*, 1896. A woman, aged twenty-five years. Onset ten months before admission, with headaches, giddiness, and unsteadiness in walking.

Status.—Short dagger-like pains over left eye. Vertical and horizontal nystagmus; pupils unequal, the left wider than the right. Reactions prompt. Optic neuritis.

Deafness in the right ear. Regurgitation of liquids through the nose. Voice bleating in character. On walking falls to right side. Station with closed eyes is swaying, falls to the right.

Operation by Annandale. The tumor was size of pigeon's egg and was removed piecemeal. Histologically, a fibrosarcoma. Following operation the headaches and vertigo disappeared, swallowing was perfect, and the gait was much improved; a little nystagmus persisted.

This case was reported by Dr. Purves Stewart in the *Edinburgh Hospital Reports*, 1895, Vol. iii, page 447.

CASE III.—MURRI (Bologna). *Lancet*, 1897, page 292. Boy, aged seventeen. Onset with tinnitus aurium and vertiginous seizures resembling Ménière's disease. Later, diminution of hearing on the left side progressing to complete deafness. Some tinnitus and diminution of hearing on the right side as well. Left seventh paralysis with increased galvanic irritability. Tenderness over the left side of the face on pressure (fifth). The corneal and conjunctival reflexes absent on the left. Speech thick. Rotary nystagmus; later becoming lateral. Optic neuritis, more marked on the left.

In addition has headaches, vertigo, and vomiting. The attacks, resembling Ménière's, persisted twenty months after the onset.

Marked disturbance of the equilibrium; falls backward, forward, or laterally, but not constantly in any one direction. Ataxia of left arm and leg. Tendon reflexes exaggerated, especially on the left. Has spells of unconsciousness, with transient rigidity, lasting one-half hour; also paroxysms of extreme vertigo and mental confusion, the face flushing and the pulse falling to 60.

Operation by Dr. Guido Bendanni. A portion of the tumor was removed from the neighborhood of the left half of the cerebellum. Total extirpation was impossible.

Histologically, the growth was a fibrosarcoma. One month later the boy was still alive and rather better than worse.

CASE IV.—JAFFÉ. *Deut. Med. Woch.*, 1897, No. 23, page 24. A woman, aged fifty-two years. General symptoms of brain tumor had existed for two years. Peculiar disturbance of gait; would turn towards the left side in a spiral manner. Evidences of pressure on the fifth, sixth,

seventh, and ninth cranial nerves on the right side. Acoustic not mentioned.

After trephining there was a discharge of bloody cerebrospinal fluid, the patient collapsing. The operation was not completed, and death occurred twelve hours later.

Autopsy.—On the under surface of the right cerebellar hemisphere, corresponding to the flocculus, is a polypoid-like tumor, compressing the middle peduncle of the pons. The sixth and eighth nerves are compressed and stretched by the tumor. The tumor was readily enucleable, and was so loosely attached that slight manipulation dislodged it. Microscopically, the growth was a fibrosarcoma.

CASE V.—SAENGER. *Neurol. Centralblatt*, 1899, page 117. A woman, aged forty-seven years. Duration of illness three years. Headaches, vomiting, blindness, double-choked disk. Impairment of memory. Hearing defective on the left side.

A palliative operation was performed. The trephine area was kept open for a month to allow the escape of cerebrospinal fluid. Following operation, vision improved with disappearance of the choked disks. A hemiparesis developed on the left side.

At autopsy a tumor about the size of a small potato was found in the left cerebellopontile angle, probably of acoustic origin.

CASE VI.—FRANK R. FRY (St. Louis). *Journal of Nervous and Mental Diseases*, March, 1904, page 157. Male, aged thirty-nine years. July, 1899, in Manila; tendency to go to the left; later, frequent vomiting in the morning; no nausea; twitching in fingers of right hand; some stiffness; rigidity of right face and right extremities; ataxia; tendency to move to left side; almost absolute deafness right side; throbbing in back of head; sensation normal.

Gait. Drunken stagger; inclines to left. Handwriting cramped. Ataxia of all extremities. Reflexes exaggerated, more on right side. Pupils normal. Eyes, right, 20/20; left, 20/20. Perimeter charts normal; disks showed swelling; slight hæmorrhage left at upper edge of disk. Eye-muscles worked in jerky way; tendency to nystagmus.

Locomotion became more difficult; ataxia more on right extremities, also face; writing impossible. Tendon jerks more plus on right side. The only disturbance of general sensibility was in the distribution of the right fifth nerve. Complained of unpleasant paræsthesia of right side of face and in mouth. No pain or hyperæsthesias. Mentally, no deterioration. Patient decided to try operation.

Operation by Dr. H. G. Mudd, March 25, 1902. Opening in skull about two inches in diameter. Before incision of dura, unusual resistance in pressing towards median line. After incision and careful palpation, a circumscribed firmness deep in substance of cerebellum. Cerebellum was incised; tumor plainly visible, smooth appearance, grayish tint. Operator introduced left index and with right hand a loop-end curette, grasped tumor gently and lifted it out. Attached only by frail, soft fibres, no resistance. Surrounding tissue carefully explored, nothing else found.

Size of tumor sparrow's egg, quite firm. Pronounced by Dr. Sidney Schwab a conglomerate tubercular growth.

One month after, some improvement; two months after, considerable anæsthesia of right conjunctiva. Speech and locomotion better. Better control of right arm and hand movements. Bulging at site of operation increasing in size and sensitiveness.

April 6, 1903. Patient says lump on back of head is larger, extends farther down; hand, arm, leg, right side jerky. Right ear deaf as ever; can eat only on left side; teeth coming out. Goes to work.

ADENOMA OF THE MUCOUS GLANDS OF THE LIPS AS A CAUSE OF MACROCHEILIA.

BY DANIEL N. EISENDRATH, M.D.,

OF CHICAGO,

Adjunct Professor of Surgery, College of Physicians and Surgeons; Attending Surgeon, Cook County Hospital, Chicago.

It has been recognized for a long time clinically that macrocheilia, or great thickening of the lips, can occur from one of two different causes, namely, inflammatory affections and the presence of genuine neoplasms. The former cause is by far the most frequent. It consists in an enormous thickening of either the upper or lower lip, or both, and occurs especially in scrofulous children, is very apt to relapse, and often very chronic in character. Microscopically, it consists of an hypertrophy of the mucous glands with an increase of all the tissues constituting the lip—that is, the connective tissue, blood-vessels, and so forth. It also occurs at times in syphilis. This condition, as has been just stated, is accompanied by an hypertrophy of the glands, but not by any great increase in their number.

Genuine tumors or neoplasms, which are primary in the lips, have been considered to be almost always of the nature of lymphangiomata, similar to a condition which occurs in the tongue,—macroglossia. In addition to the great increase in the number and size of the lymph vessels, this condition is accompanied by excessive connective-tissue formation and a moderate glandular hyperplasia. This glandular increase is, both in the case of inflammatory enlargements of the lips and in those due to lymphangioma, of a secondary nature and of a minor character.

Prior to a case reported by Fraenkel in the *Archiv für klinische Chirurgie,* Band xliv, 1892, macrocheilia, due to a

FIG. 1.—Double ptosis operated upon by Dr. W. O. Nance. Adenoma of labial glands (both lips) before operation. Operated upon by Dr. D. N. Eisendrath.

FIG. 2.—Bilateral ptosis and adenoma of labial glands (both lips) after operation.

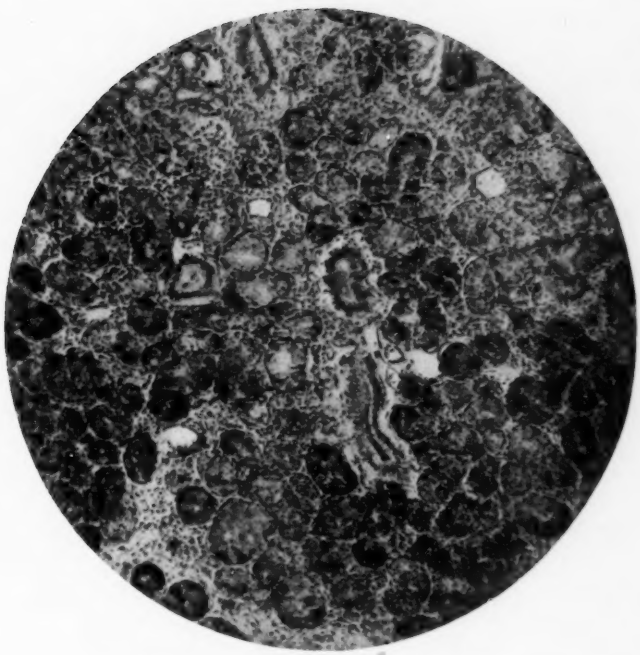


FIG. 3.—Microphotograph of adenoma of glands of lip.

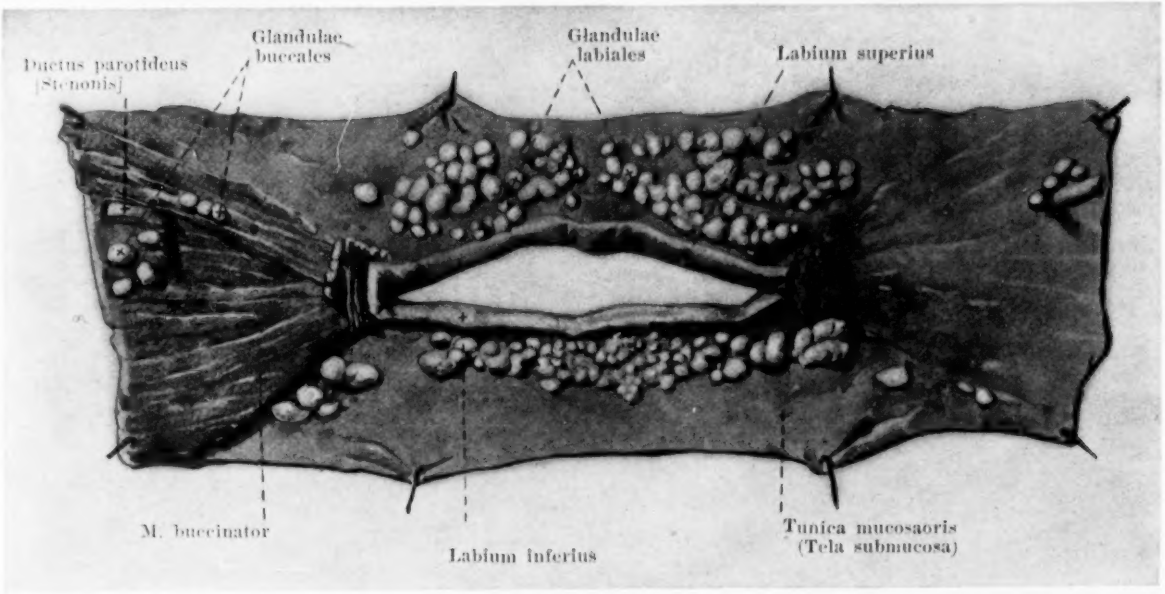


FIG. 4.—Normal distribution of mucous glands of lips. (Spalteholz.)

neoplasm of the mucous glands of the lips, was unknown. His case was that of a young man, nineteen years of age, who had noticed a steady increase in the size of the lower lip since he was four years old. It was accompanied by deformity of the jaw, which Fraenkel considered as being in a great measure responsible for the condition of the lip. There was no change in consistency and no signs of inflammation in the lip. The external appearance and findings at operation and microscopically so fully coincided with those of my own case that it will not be necessary to repeat them.

The case which I desire to report is that of a young man, sixteen years of age, who was referred to me in July, 1903, by Dr. W. O. Nance, of this city. He had arranged to have a double ptosis operated on by Dr. Nance, and desired at the same time to be rid of a disfiguring thickening and protrusion of both lips.

When he first consulted me in July, 1903, he gave the following history: He was sixteen years of age; had never suffered from any of the infectious diseases; was the only child, and had always enjoyed good health. Since the age of ten his parents had noticed a gradual, but quite marked, increase in the size of both lips. This had been rather stationary during the preceding year or two.

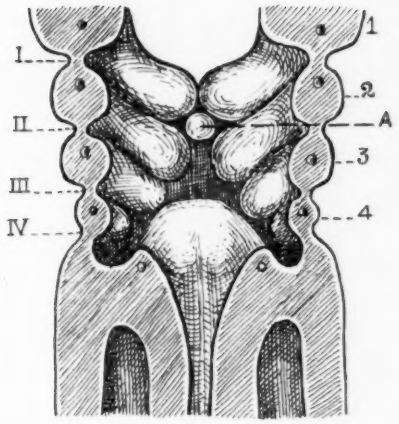
His appearance before operation is well shown in the accompanying photograph (Fig. 1). The protrusion of the upper lip was more marked than that of the lower. The skin covering the lip was smooth. There was no appearance of dilated vesicles upon the inner side. The lip was soft in consistency, not painful, and divided, as the picture shows, into two parts by a furrow corresponding to the position of the normal filtrum. My diagnosis at the time was a lymphangioma, for which I advised excision of as great an amount as possible, and treatment with hot-water injections and hot needle for the remainder. At the time of operation I was struck by the great vascularity of the parts, and upon attempting to excise a wedge-shaped portion of the lip was surprised to find that the greater portion of the thickening consisted of a number of little tumors from the size of a bird-shot to that of a pea, most of which were arranged in grape-like

manner in close relation to each other. Not having known at that time of Fraenkel's case, I interpreted these little masses to be either small lipomata or simply normal fat. After removing all of these little tumor masses, the mucous membrane was again sutured, and Fig. 2 will show the result in both the upper and lower lips. There has been a marked improvement in the cosmetic effect.

Microscopical examination of the tumors shows that they consisted uniformly of glandular tissue exactly resembling in type those of the normal mucous glands of the lips. As will be seen in Fig. 3, the appearance is that of a typical adenoma. The ducts are not dilated, and there is no tendency to cyst formation, as one might expect in inflammatory enlargement; nor is there any infiltration with leucocytes, or connective-tissue proliferation. Normally, the mucous glands are scattered, as shown in Fig. 4, along the inner side of both lips, lying in close proximity to the buccal mucous membrane. From the history and appearance of the lip at operation, and the examination of the tumors microscopically, the writer feels justified in calling the case one of neoplasm of a benign nature of the mucous glands of the lip. There has been no recurrence since operation.

This case is the second one which has ever been reported, so far as I can determine from a careful perusal of the literature, of adenoma of the mucous glands. The case is not only interesting from a diagnostic, but also from a prognostic, standpoint, owing to the fact that some of the cases diagnosed as epithelioma of the lip may prove on microscopical examination to be carcinomata of the glandular type arising from these glands.

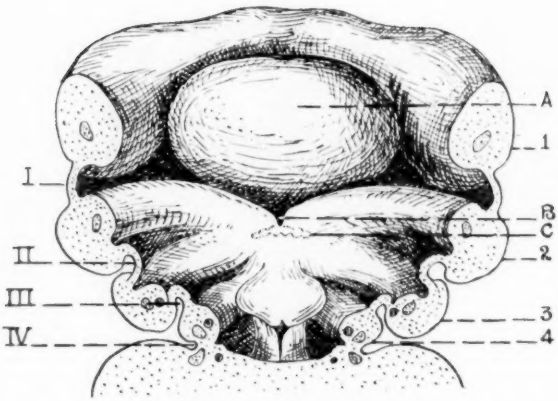
PLATE I.



Vertical section through the pharynx of a human embryo of 3.2 millimetres. *After His.*

1, 2, 3, 4. Branchial arches.
I, II, III, IV. Branchial clefts.
A. Tuberculum impar.

PLATE II.



Vertical section through the pharynx of a human embryo of 10 millimetres. *After His.*

1, 2, 3, 4 Branchial arches.
I, II, III, IV. Branchial clefts.
A. Tuberculum impar forming front portion of tongue.
B. Foramen cæcum.
C. Archage of thyroid gland.

LINGUAL GOITRE.

(ACCESSORY THYROIDS AT THE BASE OF THE TONGUE.)

BY HENRY R. STORRS,

OF BROOKLINE, MASS.

Definition.—The term goitre is a corruption of the Latin "guttur," meaning throat, and was formerly used to denote any swelling of whatever nature existing in the front of the neck. For a long time, however, the use of the word has been restricted to a swelling of one part, the thyroid gland. Lingual goitre is a tumor, consisting of normal or pathological thyroid tissue arising from one of the accessory thyroid glands which may be formed at the base of the tongue in the course of the development of the thyroglossal duct.

Embryology.—About the third week of embryonic life there appear near the end and on either side of the cephalic extremity of the embryo four protuberances or ridges extending obliquely downward and forward towards the ventral surface. These ridges are known as the branchial arches, and the intervening furrows the branchial clefts. These arches do not develop with the same rapidity, and if we examine an embryo at the end of the third week we find that while the first pair have grown so close that their ends have almost fused together, between the second, third, and fourth pairs there is a triangular space called by His the "mesobranchial space." At the top of this triangle between the first and second pair of arches a single tubercle is developed which His calls "tuberculum impar." This tubercle forms the front and main portion of the tongue, while the posterior part is made by the fused ends of the second and third pairs of branchial arches. (Plates I and II.) These three segments then grow gradually together, the two lateral halves of the posterior segment fusing together in the form of a V. Immediately behind

the tuberculum impar there appears a slight evagination of epithelium, which as it grows forms a pouch. The three segments of the tongue fusing together completely enclose this pouch, and we thus have a canal lined with epithelium leading downward from the apex of the V. This canal is named by His the "thyroglossal duct." This descends and eventually forms the isthmus of the thyroid body, the lateral lobes of this gland being derived "from the epithelium of the fourth gill clefts." About the fifth week the duct begins to atrophy, forming a fibrous cord, which passes from the dorsum of the tongue between the two geniohyoid muscles under the mylohyoid terminating in the isthmus of the thyroid body, and, in the course of time, this cord disappears, and we have nothing to show that the thyroglossal duct ever existed except a slight depression on the dorsum of the tongue, which is known as the "foramen cæcum." *

Sometimes, however, this entire obliteration does not occur, and we find in adults the whole or parts of the duct remaining. There may be a vestige left as a short tube leading from the isthmus of the thyroid upward or from the foramen cæcum downward to the hyoid bone. Bochdaleck, in a series of fifty subjects, has found in thirteen a canal anywhere from ten to fifteen millimetres in length, while His, Marshal, and others have also reported cases of the persistence of the duct.

It often happens that during the descent of the thyroglossal duct from the tuberculum impar small diverticula are formed, jutting out from the sides of the canal, and these may persist after the atrophy of the duct itself. The epithelium of these diverticula, which is the same as that lining the walls of the duct, or, in other words, is the embryonic tissue of the thy-

* I have followed the views of His as regards the embryological development of the thyroglossal duct and tongue. Late researches tend to show that the "tuberculum impar" does not alone form the forepart of the tongue, but that the greater portion is formed by outgrowths from the first pair of branchial arches. This would mean that the tongue is developed from four segments rather than three. See Verhandlungen der Anatomischer Gesellschaft, 1901, Vol. xv, pages 41, 42.

roid body, proliferates, and there are formed several masses of glandular tissue similar in structure to the thyroid body and known as accessory thyroid glands. It will readily be seen that these glands may be found anywhere between the foramen cæcum and the thyroid body, and, in fact, they are often found elsewhere in the body, Osler stating that there is a case on record of one occupying the whole right pleura (Osler, " Practice of Medicine," p. 836). For the sake of convenience, we may divide these glands into two classes,—those occurring above the hyoid bone and those below, and it is with the first of these classes that this paper deals.

Verneuil, in 1853, was the first to call attention to this subject. He says that, " while dissecting the insertions of the muscles of the tongue on the hyoid bone, a small glandular mass was exposed which was quite strongly adherent to the middle part of the superior border of this bone between the geniohyoid and genioglossus muscles. This mass was red, soft, and sessile, the size of a large pea, with a smooth, shining surface, and composed of a homogeneous tissue, which upon microscopic examination proved to be that of the thyroid gland." Since then much has been written concerning these glands by such investigators as Zuckerkandl, Kaydi, Grüber, Madelung, and others.

Their general characteristics when not in a pathological state may briefly be described as follows: their size may vary from that of a hemp-seed to a pea, while their contour is either round or ovoid, with a smooth or granular surface. They may be encapsulated and free in the deep muscles of the tongue; but, as a rule, they are attached to the hyoid bone by a kind of fibrous ligament which is supposed to be the remnant of the thyroglossal duct. Histologically, they resemble the thyroid body, and their function is probably the same as that gland, for, as I shall show later, extirpation of these glands has in some instances been followed by myxœdema. Their blood-supply is derived from branches of the lingual arteries.

Such, then, is the history in brief of the development of

accessory thyroid glands. As a rule, they cause no inconvenience and give rise to no symptoms, and a man may go through life unaware that there is anything abnormal about him. It is only when a pathological process is set up in one of these glands (I am speaking only of those at the base of the tongue) that the patient is aware of anything wrong and applies to a physician for relief, and it is then found that he is suffering from an affliction called by the French " Le goitre lingual."

That the disease is rather a rare one is shown by the fact that twenty-nine of the following cases are all, to the best of my knowledge, that have ever been reported. Through the kindness of Dr. S. J. Mixter and Dr. L. R. G. Crandon, I am able to report their two cases for the first time; while one other, that of Goris, is mentioned by Gaudier and Chevallier (*La Presse Oto-Laryngologique Belge*, January, 1903), making a total of thirty-two. It will be seen that the greater part of these have been published within the last fifteen years; and it is very probable that, while the disease may often have occurred, it is only of late years that the true nature of the growth has been recognized, and even then, in most cases, only after operation.

CASE I.—*Congenital Tumor of the Base of the Tongue pressing down the Epiglottis on the Larynx and causing Death by Suffocation Sixteen Hours after Birth.* Hickman (*Transactions of London Pathological Society*, 1869, Vol. xx, p. 160).

On July 24, 1868, Mrs. C. was delivered of a girl after a normal labor at full term. The child at first appeared lifeless, making no attempt to cry or inspire, but, after being slapped and placed in a warm bath, respiration was got up, and continued all night in a feeble manner, interrupted by short gasps or sighs. No voice nor cry could be obtained. The next morning the breathing became so difficult that a doctor was sent for in haste. Putting his finger in the child's mouth, he found a large tumor projecting from the base of the tongue. It was impossible to see or feel the deep connections of the tumor, and no question of ligature or ex-

cision could then be entertained, and the child died in spite of all efforts at artificial respiration.

Autopsy showed that at the base of the tongue was a prominent, rounded, well-defined tumor about three-quarters of an inch from before backward, half an inch across and elevated nearly half an inch above the surface of the tongue. It was hard to the touch, and its surface was covered with the normal mucous membrane of the tongue. Its lower part was in contact with the epiglottis, pressing it over the rima glottis. Microscopic examination showed the tumor to consist of glandular follicles and be very rich in blood-vessels.

CASE II.—Case of Lucke, published by Merten (*Archiv für Anatomie und Physiologie,* 1879, p. 483).

Man, twenty-two years old; had had from childbirth a tumor near the hyoid bone. For the past year it had grown considerably and caused him much annoyance. The tumor was as large as a man's fist, was situated in the median line beneath the chin and could easily be felt in the mouth, while its base was in the root of the tongue. It was supposed to be a dermoid cyst, was removed through a vertical incision from the chin to the hyoid bone. There was no adherence to this bone. The patient had entirely recovered at the end of six weeks. Histological examination showed that the tumor was composed of thyroid tissue filled with colloid material.

CASE III.—*Tubular Adenoma of Root and Dorsum of Tongue.* Parker (*Transactions of London Pathological Society,* 1881, Vol. xxxii, p. 238).

Girl, sixteen and one-half years old; had a growth the size of a walnut projecting from root of tongue. It was hemispherical in shape, firm and slightly elastic, covered with stretched and ingested mucous membrane. Excised in June, 1877, a portion being left, which by December, 1878, had increased to half the size of the original tumor. By April, 1881, it had dwindled to half that again, the patient being well and not inconvenienced by it. Microscopical examination showed it to consist of glandular tubes lined with cubical epithelium, some containing plugs of gelatinous-looking material.

CASE IV.—*The Origin of the Foramen Cæcum Linguæ as shown by an Operation on a Rare Tumor of the Root of the*

Tongue. Bernays (*St. Louis Medical and Surgical Journal,* October, 1888, Vol. lv, p. 201).

Girl, aged seventeen; complained of having great difficulty in swallowing, and that her articulation was greatly impaired by a growth under her chin, which extended into her mouth and could be seen and felt on the back part of the root of her tongue. The tumor consisted of two parts (Plate III), one as large as a bantam's egg, the other the size of a cherry. On the surface of the small tumor was a depression in the shape of a canal, about one-fourth of an inch deep, which corresponded to the foramen cæcum. The upper lobe of the tumor projected into the pharyngeal cavity and was covered by mucous membrane, only the other half lay between the muscles of the tongue, bulging out at the submental surface.

Operation consisted of a median incision from the inferior maxilla to the hyoid bone, through which the tumors were easily enucleated. They had a thin, well-developed connective-tissue capsule. Complete recovery in fourteen days. Microscopical structure proved it to be nearly normal thyroid gland tissue.

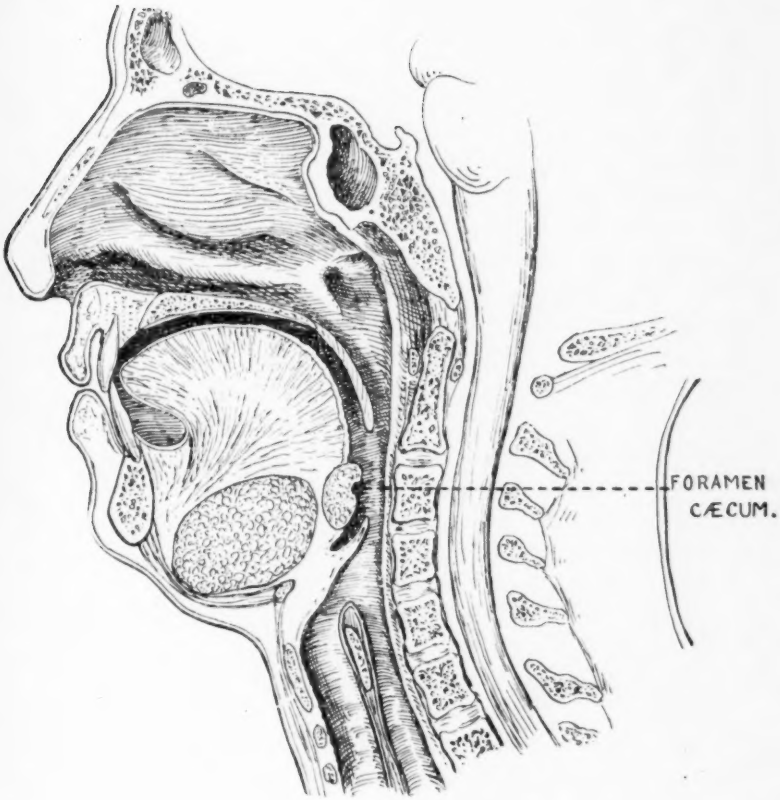
CASE V.—*Accessory Thyroid at the Base of the Tongue.* Wolf (*Archiv für klinische Chirurgie,* 1889, Vol. xxxix, p. 224).

Girl of eighteen; had complained since her twelfth year of a swelling in her throat immediately following an attack of whooping-cough, and she now had difficulty in swallowing. Simple inspection of the mouth showed nothing, but examination by the laryngoscope revealed on the left side of the base of the tongue a firm tumor about the size of a nut. Treatment with iodide at first relieved her symptoms, but the growth then suddenly began to increase in size, and one year after the patient was first seen she returned to the hospital. Tracheotomy was performed; an incision was made in the median line beneath the chin, the inferior maxilla divided, the lingual arteries tied, the tongue split, and the tumor enucleated. The tissue of the tumor proved to be that of the thyroid gland.

CASES VI, VII.—*Two Cases of Glandular Tumor of the Tongue.* Butlin (*Clinical Society's Transactions,* Vol. xxiii, p. 118, and *British Medical Journal,* December 1, 1894).

Female, aged thirty-two; had a tumor at base of tongue, which could easily be seen when the tongue was pulled out. Had noticed it for one year; was about the size of a hen's egg, round,

PLATE III.



Bernays' Case, No. IV.

smooth, covered with mucous membrane, and so elastic that, with the idea of its being a cyst, it was punctured with the result that there was a free hæmorrhage for several minutes. Patient could speak clearly and swallow without much difficulty, but had been greatly afflicted with "sore throat." Operation March 6, 1889. Tracheotomy was performed and Hahn's tube inserted. The tongue was pulled out and the tumor removed. It did not appear to be very deeply embedded in the tissue of the tongue. It appears that all of the tissue of the tumor was not removed, and by the following June it had grown to be as large as a small bantam's egg. There was no return of the symptoms, and later the growth subsided.

Female, twenty-two; for four years had occasionally vomited blood. Two years previously had noticed a swelling at base of tongue, which her doctor had lanced with much bleeding. For nine months she had had great difficulty in speaking and swallowing. Examination showed that the tumor was identical with that described in the previous case, except that it was slightly smaller. Tumor was partly removed by means of a large galvanocautery loop. There was a slight return of the growth, but not enough to give rise to any inconvenience.

Sections of both tumors showed them to be "cystic tubular adenomata" of thyroid origin.

CASE VIII.—Staelin (*Jahrbücher de Hamburgischer Staats-Krankenhaus*, 1891–92, p. 413) reports an autopsy on a woman of seventy-seven years where a tumor as large as a walnut was found in the middle of the base of the tongue. It was of hard consistency, covered with normal mucous membrane, and buried in the muscles of the tongue. The tumor proved to consist of normal thyroid tissue.

CASE IX.—*Case of Enlarged Accessory Thyroid Gland at the Base of the Tongue.* J. Collins Warren (*American Journal of the Medical Sciences*, 1892, Vol. civ, p. 377).

Female, fifty-two years of age; had first noticed lump in throat in 1870, when she was suffering from "bronchial" trouble. Since then it has slowly been growing in size. During an attack of grippe in 1892 "the tumor became swollen and inflamed, and after that the lump seemed to settle back in the windpipe, and has since caused considerable irritation, obliging her to hawk and spit constantly."

Examination showed a tumor about the size of a hen's egg, situated upon the base of the tongue, covered with normal mucous membrane, upon which ran a tortuous vessel of considerable size.

Operation.—The tongue was drawn forward by means of one ligature passed through its tip and two passed through the dorsum of the tongue on either side of the growth. The tumor was then easily enucleated through a median incision. The redundant mucous membrane was excised on either side and the edges of the wound brought together with catgut sutures. Three vessels required ligature, one of them being of considerable size. Patient made an uninterrupted recovery, and there was no return of the tumor. Dr. W. F. Whitney reported the structure to be that of the thyroid gland.

Dr. Warren also states that he has twice before seen tumors at the dorsum of the tongue which were probably of the same nature. One was removed at the Massachusetts General Hospital in the early seventies, and "consisted of tissue closely resembling that of the thyroid gland." The other occurred in a young girl of twenty-one, and was "about the size of the last phalanx of the ring-finger." It gave but little trouble. There was no operation, and the patient was lost sight of.

Case X.—*Accessory Thyroid at the Base of the Tongue.* Galish (*Deutsche Zeitschrift für Chirurgie,* 1894, Vol. xxxix, p. 560).

Female, twenty-four years of age; had a tumor the size of a walnut between the hyoid bone and inferior maxilla situated in the median line. She had first noticed it four months previously, when it appeared like a small nodule. This tumor was excised and found to be an accessory thyroid. One year later, after a noon meal, the patient had the sensation of a foreign body in her throat, and rejected in a fit of coughing about a half a pint of dark blood. Repeated hæmorrhages followed, but without effort, cough, or vomiting, the patient losing about a quart and a half of blood. A diagnosis of hæmatopsis was made and patient sent to hospital, where she had repeated hæmorrhages for several days, but without cough. She had no trouble in breathing, but her voice was considerably changed. Simple examination of the mouth showed nothing, but by means of a laryngoscope a tumor was seen attached to the base of the tongue, round, the size of a cherry, covered with a deeply injected mucous membrane. It was so

elastic that, deeming it to be a cyst, a puncture was made, which only resulted in a hæmorrhage.

Operation.—Tracheotomy and a T-shaped incision, the horizontal part of which was between the two rami of the lower jaw and the vertical in a median line, dividing in halves the hyoid bone. The tumor was enucleated, accompanied by much hæmorrhage. The patient had a rapid recovery, and there was no return. Thyroid gland was not enlarged. Tumor consisted of thyroid tissue very rich in blood-vessels.

CASE XI.—Baber, October 10, 1894, reported to the Society of Laryngology at London a case of a young girl of sixteen who had been troubled for nine months with a swelling at the base of the tongue. It was removed with a galvanocautery loop, but soon reappeared. It proved to be of thyroid tissue without cysts.

CASE XII.—*Case of Accessory Thyroid Gland projecting into the Mouth.* Bond reported by McIlraith (*British Medical Journal,* December 1, 1894).

Girl, seventeen years old; complained of a lump at the back of the tongue. Had noticed it for two months. It gave no trouble, except that her voice was a trifle thick. Examination showed a tumor the size of a walnut situated close to the foramen cæcum. It was semielastic and immovable on the deep tissues of the tongue. The thyroid was normal.

Operation.—Mucous membrane round about tumor was cut with a pair of curved scissors. It was then fixed with a pair of tenaculum forceps and removed with the aid of a raspatory and a Mackenzie's polypus snare. There was profuse bleeding, which was controlled by pressure at the base with a finger, round which a piece of lint steeped in turpentine was wrapped. Wound healed in ten days. The structure of the tumor was that of the thyroid gland.

CASE XIII.—*Accessory Thyroid at the Base of the Tongue.* Lympius (*Deutsche Zeitschrift für Chirurgie,* 1897, Vol. xliv, p. 451).

Female, aged thirty-four; had had for two years a swelling at the base of the tongue, which had steadily increased in size and gave difficulty in speaking and swallowing. For some years she had had a sensation of suffocation and hoarseness. In April, 1894, there was a hæmorrhage followed by an increase in the size of the tumor. In June it was lanced by a doctor, profuse bleeding

followed. When she entered the hospital the patient spoke as if she had a "billiard-ball" in her mouth and swallowed frequently. A tumor as large as a walnut was seen at the base of the tongue, firm to the touch, covered with blood-vessels, and pressing down upon the epiglottis.

Operation.—Tracheotomy was performed and the mouth kept open with a gag, the palatoglossal muscles incised, the tongue drawn forward, and tumor enucleated, accompanied by a severe hæmorrhage. There was complete recovery and no return of the growth. Tumor consisted of very vascular thyroid tissue.

CASE XIV.—*Accessory Thyroid at Base of Tongue. Myxœdema after Removal.* Seldowitsch (*Centralblatt von Chirurgie,* 1897, p. 499).

Girl, fourteen years old; had swelling at base of tongue near the foramen cæcum; was round, smooth, firm, the size of a cherry, projecting on the dorsum of the tongue and causing considerable annoyance. Patient was unaware how long it had been there. Tumor was removed with a galvanocautery loop and proved to be of thyroid structure.

Patient returned to the hospital in six months with all the symptoms of myxœdema. The thyroid could not be felt.

CASE XV.—*Goitre at the Base of the Tongue, Myxœdema following Operation.* Kraske reported by Von Chamisso (*Beiträge zur klinischen Chirurgie,* 1897, Vol. xix, p. 281.)

Woman, thirty-seven years old; afflicted with cretinism and complete absence of thyroid body; complained of trouble in speech, deglutition and respiration. On the base of the tongue, slightly to the right of the median line, was a swelling as large as a walnut, with a smooth surface covered with large vessels. To the touch part was firm and part fluctuating.

Operation.—Tracheotomy, traction forward on the tongue and enucleation. Structure was in part that of embryonic thyroid tissue and partly that of ordinary goitre with colloid degeneration. Patient returned in four months with symptoms of myxœdema, and was treated with thyroid extract.

CASE XVI.—Reintjes, of Nymegen, on May 23, 1898, reported a case of lingual goitre to the Society of Laryngologie, Rhinologie, and Otologie of Holland. It occurred in the case of a man twenty-five years old, who was troubled with severe hæmorrhages. These were without apparent cause and were not accom-

panied by vomiting or coughing, but sometimes followed the swallowing of a large mouthful of food. At the base of the tongue could be seen a swelling. It was of dark brown color, smooth and elastic to the touch, and covered with large veins.

Operation.—Tracheotomy, traction forward on the tongue, the anterior pillar of the fauces divided, capsule of tumor split horizontally, and tumor shelled out. Tumor consisted of thyroid substance.

CASE XVII.—Treitel, before the Berlin Medical Society, May 25, 1898, reported a case of presumable lingual goitre which had existed for twenty years in a woman. The symptoms were slight, only occasional trouble in swallowing. There was no operation.

CASE XVIII.—Benjamins (*Nederl Tijdsch voor genesk,* 1899) reports a case of goitre at the base of the tongue occurring in a man. There was absence of the true thyroid. Operation was followed by symptoms of myxœdema.

CASE XIX.—Posthumus Meyjes read before the Society of Otologie and Laryngologie of Belgium, June 4, 1899, a case of a woman of twenty-four years who since childhood had had the sensation "as if there were a potato stuck in her throat." From time to time she spat up bloody pieces of mucus. Examination showed a tumor occupying the right half of the base of the tongue, protruding 2.5 centimetres, round, smooth, not painful, immovable, and covered with dilated vessels. No true thyroid could be felt. There was no operation.

CASES XX, XXI.—*Two Cases of Accessory Thyroid Tumors at the Base of the Tongue.* Schadle (*Journal of American Medical Association,* August 12, 1899, Vol. xxxiii, p. 386).

Woman, twenty-five years of age; had noticed for the past six months a growth at the base of her tongue. The condition caused her more mental annoyance than physical discomfort. Menstrual function had been rather irregular of late. Respiration and deglutition were not interferred with, but impairment of speech was noticeable, the voice being thick and not resonant. Examination showed the growth to be the size of an English walnut, covered with mucous membrane, which showed an intense superficial vascularity, of a deep purplish red color, hard, and immovable. Exploratory puncture was followed by copious bleeding. For two months electrolysis was employed, with the

result that the tumor was reduced to one-third of its original size. During the time of the apparently suppressed menstrual function, the lingual tumor would swell and become very vascular, —a very peculiar phenomenon. Several violent hæmorrhages then occurred, and an operation was advised and performed by Dr. McBurney. The tumor was enucleated through an incision extending from the symphysis menti to the hyoid bone. There was considerable hæmorrhage and no return of the tumor.

Its structure was that of the thyroid gland.

The second case was that of a woman, twenty-three years old, who had noticed a growth upon the base of her tongue for ten years. Her voice had entirely lost its resonance, she had some difficulty in swallowing, and a shallow, resistant cough. Inspection showed a tumor situated at the base of the tongue anterior to the epiglottis. It was smooth, dense, of a dusky red color, with a characteristic resilient feel, and appeared perfectly homogeneous. Operation was refused, but the characteristics of this tumor were so typical that we can safely call this an accessory thyroid.

CASE XXII.—Dr. Holmes (same reference) reported a case in every respect similar to that of Dr. Schadle. In this case the tumor was partly removed by the galvanocautery.

CASES XXIII, XXIV.—*Two Cases of Accessory Thyroid Glands at the Base of the Tongue.* Watson (*New York Medical Journal,* Vol. lxx, p. 579, October 21, 1899).

Woman, fifty years of age; complained of great dyspnœa and difficulty in swallowing. She stated that there had been a lump in her throat for the past ten years, which had given little trouble until recently, when it had begun to enlarge. Examination showed a smooth tumor at the base of the tongue pressing back upon the epiglottis. It was about an inch and a half long, one inch wide, and an inch thick; it was smooth and firm, with an ulcerated top, the ulcer being covered by a white slough or membrane. Part of the tumor was removed with the galvanocautery loop. Structure was that of a degenerated thyroid body.

The second case was that of a colored girl sixteen years old. There had been a "lump in her throat" for five years, which had lately interfered with her swallowing. Examination showed a growth in every way similar to that of the previous case, except that it was not ulcerated. Tumor was removed with the galvanocautery snare. Structure was that of the thyroid gland.

CASE XXV.—*Thyroid Tumor at the Base of the Tongue.* Vallas (*Revue de Chirurgie,* May 10, 1900).

Young girl of twenty years; complained of difficulty in swallowing; the tone of her voice was altered and resembled the voice of patients with ranula. Examination showed a tumor the size of a small nut situated behind the foramen cæcum on the dorsum of the tongue, elastic, and not painful upon pressure. Diagnosis of cyst of the thyroglossal canal was made.

Operation.—Incision was made above the hyoid bone to the right of median line, and a puncture made into the mouth through the tumor. Drainage was established, and the wound healed well; the patient left the hospital much improved. Six months later she returned, saying that as soon as the drainage gauze had been removed the tumor had begun to grow. This time a median incision was made, the hyoid bone divided, the fibres of the mylohyoid separated, and whole tumor easily enucleated. There was no return. Histological examination showed structure of the thyroid gland.

CASE XXVI.—*Case of Accessory Thyroid Tumor at the Base of the Tongue.* Theisen (*Albany Medical Annals,* 1901, Vol. xxii, p. 537).

Tumor occurred in a woman sixty-seven years old, and was identical in every way with those of Dr. Warren and Dr. Schadle. Owing to the age and condition of the patient, operation was not advised. In this case the patient, when quite young, had a well-marked goitre, now the thyroid cannot be felt. The tumor also appears larger at times than others.

CASE XXVII.—*A Case of Lingual Goitre.* Curtis and Gaudier (*Revue Hebdomadaire de Laryngologie, Otologie, et de Rhinologie,* Vol. xxiii, p. 417, April 12, 1902).

Young woman of twenty-one years; complained of difficulty in swallowing and talking. Her voice had a nasal quality, not very sonorous, often hoarse or muffled. She had had a growth on her tongue for five years. This had been partially cut and cauterized two years previously, but lately had returned. Examination with a laryngoscope showed behind the lingual V a round tumor, the size of a large nut, covered with normal mucous membrane and a fine net-work of vessels. It was of elastic, almost soft, consistency, and seemed firmly embedded in the muscles of the tongue. The thyroid body was small and the lymph glands normal.

Diagnosis of lipoma or liposarcoma.

Operation.—The mouth was kept open by a gag, a silk suture passed through the tongue, which was then drawn forward as far as possible. Another strong silk suture was then passed under the mass of the tumor and well within the normal tissue of the tongue. This suture not only assisted in drawing out the tongue, but after operation acted as a hæmostat, and allowed the edges of the wound to be quickly approximated. The tumor was then enucleated through a median incision of its mucous membrane covering. There was profuse bleeding. Recovery was complete and there was no return of the growth. The structure of the tumor was that of a typical thyroid gland.

CASE XXVIII.—*Accessory Thyroid Tumor situated at the Base of the Tongue.* Winslow ("American Medicine," December 13, 1902).

Girl, aged seventeen; complained of having difficulty in swallowing. Had always been troubled with sore throat, and her voice was muffled and indistinct. Examination showed an ovoid mass about half the size of a hen's egg upon the base of the tongue between the foramen cæcum and the epiglottis. It was smooth, covered with mucous membrane, and somewhat elastic to the touch.

Operation.—The growth was thought to be too large to remove through the mouth, and was enucleated through a median incision from the chin to the hyoid bone. Wound healed by first intention. Structure of tumor was that of the thyroid gland.

CASE XXIX.—*Thyroid Tumor at the Base of the Tongue.* Gaudier and Chevallier (*La Presse Oto-Laryngologique Belge*, January, 1903).

This occurred in a girl twenty years old. It had existed for three years, and was in every way identical with the previous case reported (Case XXVII). This time, as the patient's tongue was very short and plump and the tumor very far back, it was decided to operate by incision through the hyoid bone, as described in Case XXV (Vallas). A median incision was made, the hyoid bone divided, and the tumor enucleated. As no normal thyroid body had been found, it was thought best to leave a small section of the gland in order to avoid the after appearance of myxœdema. Complete recovery. Section of tumor showed thyroid tissue.

CASE XXX.—The same authors cite a case of Goris which

has never been published, in which the removal of a lingual goitre was followed by myxœdema. In this case operation was through the mouth, and the tongue was cut from its anterior insertions in order that it might be drawn forward.

CASE XXXI.—*Accessory Thyroid at Base of Tongue.* S. J. Mixter (Massachusetts General Hospital, August 9, 1895).

Female, age twenty-four; had noticed a swelling on back of tongue for three weeks, which had not given any inconvenience in swallowing or talking. There was no pain. Examination showed a mass about the size of a small hickory nut on the dorsum of the tongue. Another, about the same size, can be felt under the symphysis of the jaw.

Operation.—Incision in the median line of neck two inches long and tumor shelled out. Growth was the size of a white grape and connected with the thyroid. Other tumor was removed through the mouth by an operation similar to Dr. Warren's case, No. IX. Tumor consisted of thyroid tissue. Recovery was complete.

CASE XXXII.—Dr. L. R. G. Crandon had as a patient a young girl, nine years of age, who had noticed a growth in her throat for one and a half years. She complained of having great difficulty in breathing while in bed. She was unable to assume a recumbent position and was obliged to sleep while sitting propped up with pillows. A year ago she consulted a throat specialist, and an attempt was made to remove the tumor. Such a profuse hæmorrhage occurred that the operation was stopped. Examination showed a growth about the size of a nut situated at the base of the tongue, ovoid in shape, covered with smooth membrane and elastic to the touch. (Plates VI, VII, VIII drawn from life.) The case has not yet come to operation.

Etiology and Evolution.—The most striking etiological fact regarding lingual goitre is its occurrence among women rather than men. Thus, out of thirty-two cases we have but three occurring in men, namely, those of Lucke, Reintjes, and Benjamins. In this respect the affection is similar to the more ordinary forms of goitre which are found much more frequently in women than in men. Why this is so has never been satisfactorily explained.

Grüber states that in a series of 300 subjects with superior accessory thyroid glands, 250 were men and fifty were women, and again, out of twenty-three other cases, eighteen were men and five women. These figures show that accessory thyroids occur overwhelmingly more frequently in men than in women, and yet we find that in women they develop into tumors and give rise to lingual goitre in the proportion of twenty-nine to three. Why is this? It is a question that cannot be answered at the present time, and a dense cloud of obscurity hangs over the etiology and pathogenesis of all forms of goitre.

Lingual goitre may occur in patients at any period of life. Thus, in the case of Hickman, we find it occurring in a newborn child, while in the autopsy reported by Staelin the subject was a woman of seventy-seven years.

It is, however, generally to be found in women between the ages of fifteen and forty. There is no reason to doubt but that the accessory thyroids at the base of the tongue may undergo the same morbid processes as the thyroid body itself in a case of ordinary goitre. In some cases we find that these lingual glands, in the absence of a normal thyroid body, have undergone a compensatory hypertrophy, and have taken up the function of the thyroid itself, so that after extirpation the symptoms of myxœdema have appeared (cases of Seldowitsch, Kraske, Benjamins, Meyjes, and Goris).

The evolution of lingual goitre is like its etiology, not well understood. In most of the cases, the presence of the growth had been perceived for a long time without any inconvenience arising from it. Then all at once the tumor begins to grow, and we have a chain of serious symptoms. What is the reason for this long latent period and sudden eventual quick development? In but two cases is there any specific cause stated. Dr. Warren's patient, who had noticed the growth for twenty years, said that during an attack of grippe the tumor became swollen and inflamed, and after that "the lump seemed to settle back in the windpipe," and then caused considerable irritation, obliging her to "hawk and spit con-

PLATE IV.

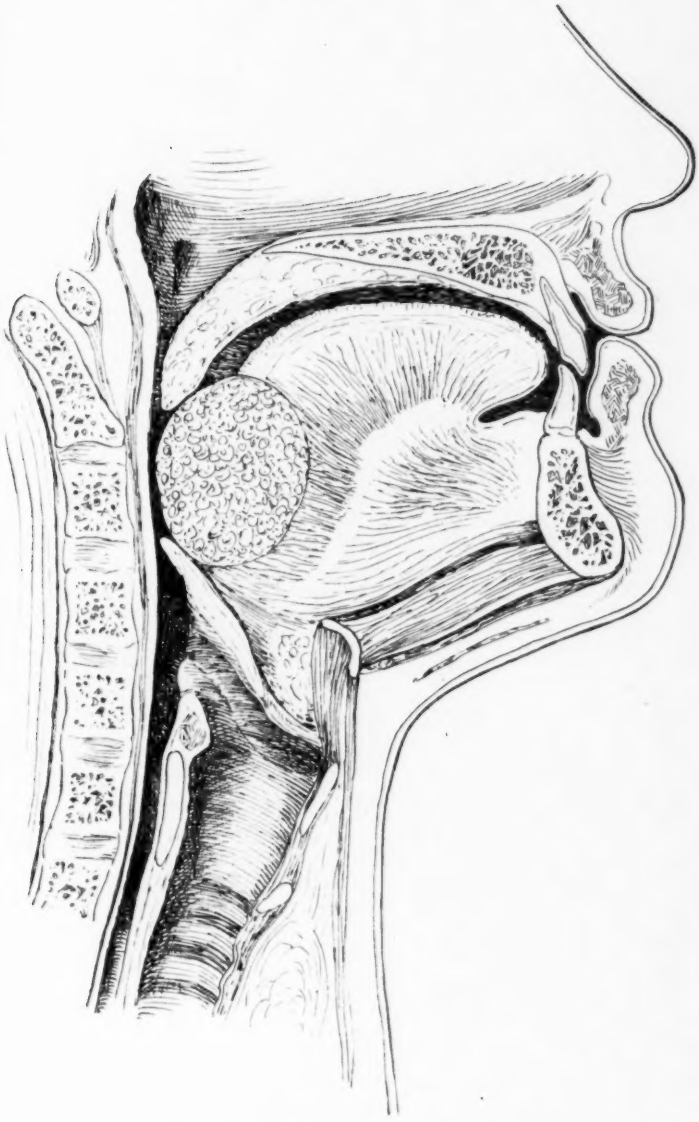
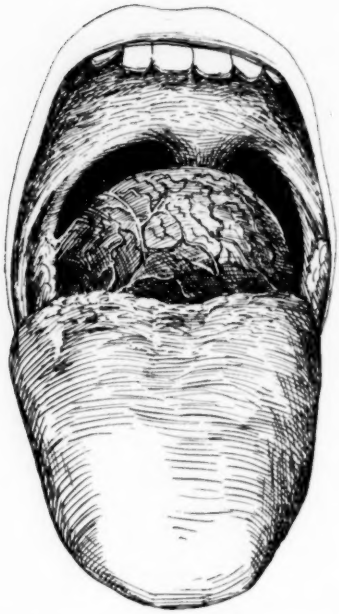


Diagram showing typical situation of tumor.

PLATE V.



View through mouth with tongue drawn forward showing the vessels on surface of tumor.

PLATE VI.

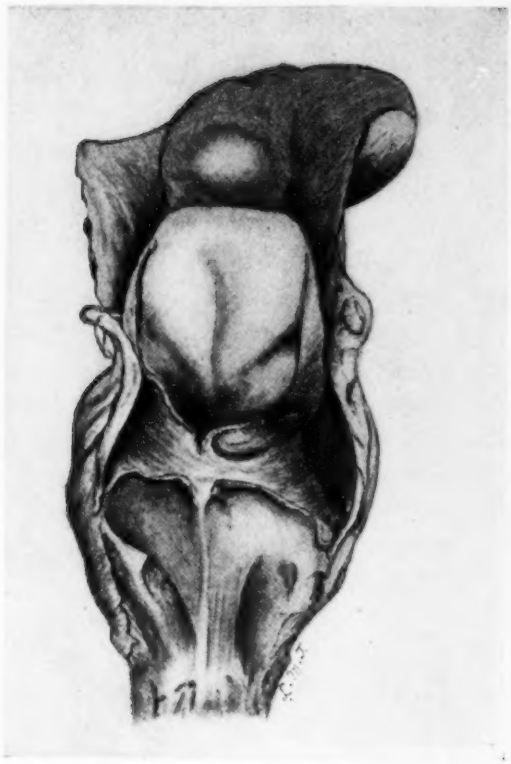
Showing appearance of tumor in mouth.

Unpublished case of Dr. Crandon, Case XXXII.

PLATE VII.

Laryngoscopic view.

PLATE VIII.



Rear view, showing tongue, tumor, and epiglottis.
VI and VII drawn from life; VIII, constructed.

tinually." In Wolf's case the patient first noticed the growth after an attack of whooping-cough, but in both of these cases we cannot call the grippe and whooping-cough the specific causes of the tumors, and in all probability it is a simple coincidence that the one followed on the heels of the other. It is very likely that puberty plays an important rôle in the development of these growths, as it appears to do in that of normal thyroids.

Pathological Anatomy.—These lingual tumors present in the main the same macroscopical appearances. They are situated upon the dorsum of the tongue, generally just behind and below the foramen cæcum, but sometimes enclosing it in their growth (Bernays), on the median line, as a rule, but perhaps a little to the right or left. In shape they are round or ovoid, while their volume is quite variable, ranging from the size of a cherry or small nut to a man's fist. The tumor is encapsulated and may project markedly about the surface of the tongue, or be almost buried in the muscles of this organ. In either case there is no inflammation or infiltration of the surrounding tissues, and at operation the tumor has in most cases been easily enucleated. (Plate IV.) Its surface is covered with the mucous membrane of the tongue, and in only one case (Watson) has there been any ulceration. It is smooth and shining, and in color is darker than that of the surrounding mucous membrane, due to the great infiltration of blood-vessels which is always to be seen. These vessels not only cover the surface of the goitre, but penetrate deeply into its tissue and cause the profuse hæmorrhages which occur at operation. This rich vascularization is a striking and characteristic feature of lingual goitre, and is of great value in differential diagnosis.

The tumor may or may not be movable. This depends upon its age, size, and the depth to which it has penetrated the muscles of the tongue. Its consistency is very variable. We may find a firm, elastic mass or a soft and fluctuating one. This variability depends upon the structure of the tissue of the tumor. Thus, in Bernays's case the growth consisted of

almost normal thyroid tissue. In Warren's there was colloid degeneration; then, again, in that of Kraske the tubules were full of embryonic thyroid cells; and still again we find the formation of cysts containing yellowish transparent fluid. (Gaudier and Chevallier.)

Symptoms.—The presence of lingual goitre is marked by a variety of symptoms. The troubles caused by it are purely functional, and these vary with the size of the tumor. In but one case do we find any constitutional symptoms present; in all the others the patients appeared to be in the best of health. This single case is the first of those reported by Schadle in a woman of twenty-five. He states, "she was anæmic and the muscles soft and flabby. Evidences of malnutrition and nervous exhaustion were marked. She complained of insomnia and gastric derangement. A heavily coated tongue, loss of appetite, constipation, and distressing flatulency of the bowels were pronounced symptoms." There is. however. no reason to connect this set of symptoms with the growth on the back of the tongue, except in so far as to produce an excessive amount of mental worry.

The size and the situation of the tumor determine the severity of the symptoms. It may be as large as a walnut, and yet cause no inconvenience (Staelin), and again may be the size of a cherry, and yet be so situated that by projecting into the pharynx cause serious trouble. The symptoms are those such as would be produced mechanically by any foreign body, and with one exception are not at all pathognomonic, but are characteristic of all tumors of the tongue which mechanically obstruct the entrance to the œsophagus or trachea.

The patient may be aware of the growth for many years without being inconvenienced by it. The first symptom is generally an uncomfortable feeling at the base of the tongue, a fulness in the throat, accompanied by a frequent desire to swallow. The voice then begins to change. It may be simply thick or nasal in quality, or it may entirely lose its resonance and be muffled and dead. Deglutition is often seriously inter-

fered with, the patient finding it quite painful to swallow. There may be increased salivation, and fits of coughing due to irritation of the salivary glands and epiglottis. The respiration is troubled only in the cases of the largest tumors, or where the situation is low down enough so that the tumor presses the epiglottis over the rima glottidis, and this may be marked enough to cause death by suffocation. (Hickman.) The one symptom characteristic of lingual goitre, and upon which great stress should be laid, is the occurrence of profuse hæmorrhages. These occur at any time and without any apparent cause. They are unaccompanied by coughing, vomiting, or pain, and the patient is simply aware that her mouth is filled with fluid, which on expectoration proves to be blood. These hæmorrhages are due to the rupture of one of the many vessels covering the mucous membrane of the growth. (Plate V.) The mucous membrane is very thin, and is continually being torn by bits of food passing into the œsophagus or by constant rubbing against the epiglottis and posterior wall of the pharynx.

Examination of the mouth may result in nothing being seen, and, even when the tongue is drawn out as far as possible, the growth may not be visible, and its presence can only be determined by the use of the laryngoscope. By this means the general characteristics of the growth may be distinctly made out, and then with the finger its outline, consistency, and the lack of pain on pressure may be further ascertained. In only one case (Bernays) has there been any swelling beneath the jaw; but if there exists a large tumor, it may be felt upon deep palpation just below the inferior maxilla. It is especially important to discover, if possible, by palpation the presence or absence of the normal thyroid, in order to avoid the possibility of myxœdema following operation.

Diagnosis.—The diagnosis of lingual goitre is not always easy unless we have present the typical chain of symptoms. If the patient, especially if a woman, complains of a lump in her throat that has existed there for several years with no incon-

venience, that it has lately begun to grow, causing a change in her voice, trouble in breathing and deglutition, and especially if she complains of frequent hæmorrhages unaccompanied by cough or vomiting, and if, upon examination, a round, elastic tumor with a deeply injected mucous membrane is found at the base of the tongue, we are led at once to think of lingual goitre. Oftentimes the presence of hæmorrhages from the mouth is the only symptom; and if this is the case, we must rule out diseases of the lungs and stomach by physical examination and exclusion. The former can be ruled out by the absence of cough and the latter by absence of vomiting.

Given, then, a tumor at the base of the tongue, the main point in differential diagnosis is as to whether it is benign or malignant, in order that an operation exceeding the requirements of the case be not performed. The slow growth of the tumor, the long latent period, and the sudden development, absence of pain, and infiltration of the surrounding tissues, absence of enlargement of the cervical glands and the general good condition of the patient, all point towards a benign growth. Furthermore,

Sarcoma grows to a considerable size rapidly, is painful, and can only be confounded with lingual goitre in the beginning, when it is simply an indurated nodule.

Carcinoma is not, as a rule, seen until late in life, is almost always ulcerated, is painful, and produces a very fetid secretion.

Granted, then, that we have a benign growth, what is its nature?

Lipoma is quite soft, presenting more the appearance of a cyst than a goitre. Its golden yellow color can be seen shining through the mucous membrane covering, which is usually quite loose. It is, moreover, quite rarely to be found at the base of the tongue, its more common situation being in the middle or tip of this organ.

Angioma is quite common at the base of the tongue. It may be covered with tortuous vessels and give rise to hæmor-

rhages, but its color is violet or bluish black, and is quite easily reduced upon pressure, immediately filling again.

FIBROMA, pure or mixed with fatty, bony, or cartilaginous elements, may be found in the tongue; but it tends to become pediculated quite quickly, and presents the appearance of a polypoid growth.

SYPHILITIC GUMMA grows in a different manner. It tends to ulcerate quickly, is often multiple, is not sharply defined; its mucous membrane covering is not deeply injected, and it is accompanied by other manifestations of syphilis.

HYPERTROPHY OF THE LINGUAL TONSILS is not very frequent; it is a superficial swelling only, and consists of whitish, yellow, hard concretions, which distend the crypts of the lymph follicles and project from the surface of the tongue.

CYSTS may occupy the same position as goitre at the base of the tongue, but, as a general rule, they are softer and more fluctuating. If the goitre has undergone cystic degeneration, the differentiation is more difficult. The color of a cyst differs, being yellow or brownish; its surface is not so markedly covered with vessels, while the membrane covering itself is thinner and more transparent. Dermoid cysts may greatly resemble goitre, but their growth is more rapid; there is no latent period; their color is yellow; they lack vascularity, and pit upon pressure.

Prognosis and Treatment.—The prognosis of lingual goitre is favorable. There have been no postoperative deaths, and in all cases that have come to operation the cure has been permanent. Medicinal attempts to cure the disease have been of little avail. Iodide seems to have a slight effect in reducing the growth, but its action is slow and rather ineffectual. Counter-irritation with iodine has been tried, and caustics and electrolysis have been used, but none of these methods have proved satisfactory, especially as in most cases the patient does not apply to a physician for relief until the symptoms are so grave that a quick removal of the growth is imperative.

Simple puncture or puncture followed by injections of

chloride of zinc or tincture of iodine are not to be recommended. Puncture is, in all cases of goitre, followed by profuse bleeding, and sometimes by inflammation and a sudden increase in the size of the growth. Moreover, the only thing to be learned by puncture is as to whether or not the tumor contains fluid. In the first case, we transform the growth into a loose pouch, which is harder to enucleate than if it were full; and in the second we accomplish nothing, and moreover expose the patient to the danger of infection.

The only rational method of treatment then is removal. The two principal means for accomplishing this have been by the use of the galvanocautery loop (Butlin, Baber, Seldowitsch, Holmes, Watson) and by incision with enucleation (Butlin, Warren, McIlraith, Lympius, Kraske, Reintjes, Gaudier, Lucke, Bernays, Schadle, Winslow, Galish, Wolf, Vallas, Mixter).

The use of the galvanocautery loop has, on the whole, been rather unsatisfactory. In all the cases in which it has been used, parts of the tumor have been left, causing a slight return of the growth. This return has not been excessive, but it is to be regretted, unless rendered necessary by the absence of a true thyroid.

There remains then total enucleation. This is a comparatively easy operation, as the tumor is well defined and not adherent to the neighboring tissues. The base of the tongue may be reached in two ways, either through the buccal cavity or through an incision in the suprahyoid region, which may be simple or include the hyoid bone or inferior maxilla.

Enucleation through the mouth is the method chosen by Butlin, Warren, McIlraith, Lympius, Kraske, Reintjes, Gaudier, and Mixter. This operation is as follows. After etherization the jaws are kept open as far as possible by means of a gag; a silk ligature is then passed through the tip of the tongue for traction, and a second ligature passed through the muscles of the base of the tongue under and below the mass of the tumor. This second ligature renders traction on the tongue

quite easy, and after enucleation is of great assistance in controlling the hæmorrhage and in approximating the edges of the wound. The tongue is then drawn forward as far as possible until the tumor appears between the incisors, a longitudinal incision is made in the growth, and the tumor enucleated. The redundant mucous membrane on either side of the wound is then trimmed off and the edges brought together with catgut sutures. In some cases tracheotomy has been first performed, but this procedure does not seem to be indicated. The patient may be placed in Rose's position with the head extended over the edge of the table, and in this way the blood may be kept from running down into the trachea. It is well, also, to keep the pharynx as clean as possible by sponging it at intervals with some antiseptic solution.

The simple suprahyoid method has been used by Lucke, Bernays, Schadle, and Winslow. An incision is made from the symphysis menti to the hyoid bone in the median line, dividing all the structures down to the tumor, which can then be enucleated. The opening made in this manner is rather small; and if the tumor is at all large or situated rather high on the dorsum of the tongue, enucleation is rendered quite difficult. To overcome this trouble, Wolf first performed tracheotomy, made a median incision above the hyoid bone, ligatured the lingual arteries, divided the inferior maxilla, and split the tongue itself until he reached the tumor. This procedure gave a large opening in which to work, but the operation is too serious, too long, and too mutilating; it is, moreover, unnecessary, as the method employed by Galish, Vallas, and Gaudier accomplishes the same result and is much simpler. An incision is made in the median line from the chin to the superior angle of the thyroid cartilage. The hyoid bone is then denuded and divided in halves, and the incision carried through the mylohyoid and geniohyoid muscles to the tumor. After enucleation, the hyoid bone is sutured with silver wire and the muscles and skin with catgut, horsehair, or whatever is desired. The opening made in this manner is large and the wound heals easily and quickly.

The indications for each of these operations depend upon the size and situation of the tumor. The buccal method is easily the best when practicable. It is but a short operation, is simple, and leaves no scar, which is a great advantage when we consider that most of the patients are women. This method can be used when the patient's mouth is large, the tongue long and slender, and the tumor of not very great size and situated rather high on the base of the tongue. If the tumor is large and low, the patient's tongue thick and short, and the mouth small, then, if possible, it is best to use the simple suprahyoid incision. If the opening thus made is not large enough, then the hyoid bone may be divided.

CONCLUSIONS.

1. Lingual goitre is a tumor at the base of the tongue, arising from an accessory thyroid gland which may be found in the course of the development of the thyroglossal duct.

2. It has all the characteristics of ordinary goitre.

3. It occurs almost exclusively in women between the ages of fifteen and forty. It grows slowly, and may exist for years without causing any annoyance until some unknown cause stimulates its growth and produces symptoms. These are functional and not constitutional, and consist of trouble in swallowing, breathing, and speaking, accompanied by frequent hæmorrhages.

4. The tumor is round or ovoid, elastic, and covered with a very vascular mucous membrane, and is almost never ulcerated.

5. Dermoid cyst offers the only difficulty in differential diagnosis, but this is generally yellow, grows rapidly, pits on pressure, and has not the vascularity of goitre.

6. Operation is the only radical cure. There are two ways of reaching the tumor, namely, through the mouth and through an incision in the suprahyoid region, the former being the best.

7. The prognosis is good.

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PURULENT MASTOIDITIS.

SINUS THROMBOSIS; THREATENED CEREBRAL ABSCESS; RECOVERY AFTER OPERATION.

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THE patient, J. S., a boy of six years, was admitted to the Elder Cottage Hospital, Govan, on December 2, 1903, complaining of a "discharge from the ear" of considerable duration, together with, recently, pain and tenderness over the part, and slight headache.

On examination there was found to be a purulent discharge from the left ear; the left tympanic membrane was gone, and there was bare bone on the inner tympanic wall. There was tenderness to pressure over the mastoid region. Patient also complained slightly of tenderness on pressure over the course of the internal jugular vein, the tissues in that region being palpably thickened. The pupils were unequal, the left being slightly smaller than the right. Patient's intelligence was dulled, his answering being very slow. Temperature and pulse were both rather subnormal.

A diagnosis of suppurative mastoiditis, with septic sinus thrombosis at an early stage, without systemic involvement, and with encephalitis, threatening abscess formation, having been made, operation was decided on.

The parts were prepared, and the operation performed within twenty-four hours of my first seeing him.

For an hour or so prior to the operation, patient was noticed to be very drowsy, requiring to be roused to answer questions, and immediately dropping over to sleep again.

The radical mastoid operation was performed through a straight incision, immediately posterior to the pinna; the periosteum was reflected and the bone fully exposed. An opening was first made, through the suprameatal triangle, down to the mastoid antrum, when pus immediately welled up. The opening was en-

larged by a burr, and the antrum found full of pus. The mastoid region was now thoroughly opened up with the surgical engine, all the cells containing pus being cleared out, until, finally, smooth, healthy bone was exposed in all directions. The granulation tissue in the middle ear was also cleared out, the malleus and incus being removed. The facial canal was examined and found to be intact.

The cavity thus made having been thoroughly disinfected, the dura mater covering the temporosphenoidal lobe was exposed. It was found to be inflamed, and the vessels on its surface were engorged; but it was hoped that this condition might diminish with the removal of the cause, and the membranes were therefore, meanwhile, left intact.

The sigmoid sinus was next exposed. While the lumen of the sinus was not entirely occluded, its walls had completely lost their natural elasticity. The anterior wall in particular, which was bathed in pus, was very much thickened.

The surrounding parts having been thoroughly cleaned and disinfected, the wound was filled with iodoform and boracic powder and packed with iodoform gauze. A fine piece of iodoform gauze was also introduced through the external auditory meatus; then a dressing was applied, and the patient was returned to bed.

After the operation the temperature remained normal, and the pulse became more rapid (100–130). The left pupil remained slightly smaller than the right for two or three days after the operation. During this period patient was at times restless, at others drowsy, and he vomited several times. After this, however, he rapidly came round, and became bright and intelligent.

The dressing was changed on December 18, fifteen days after the operation, and the parts were found to be covered with a thin layer of healthy granulation tissue. Tenderness to pressure over the jugular had entirely disappeared. The dressing was again changed on the 24th, when granulations were found to be growing vigorously, and thereafter the dressing was changed when necessary, some half-dozen times in all.

Patient made an uninterrupted recovery despite an attack of chicken-pox during his convalescence, and is now (April, 1904) strong and active, the only sign of the operation being a very slight scar behind, and hidden by, the pinna of the ear.

ON THE USE OF AN ELECTRO-MAGNET FOR REMOVAL OF A FOREIGN BODY FROM A BRONCHUS.

BY ANDREW J. HOSMER, M.D.,

OF SALT LAKE CITY, UTAH,

On March 31, 1904, a female child sixteen months old, while lying on its back on the nurse's lap playing with a shingle-nail, was observed to suddenly strangle and cough severely, and the nail had disappeared. The mother was away from home, and did not return for about half an hour. The child coughed considerably, but before the mother's return had eaten a good meal of bread and milk, and was in good condition except an occasional cough and a wheezing respiration. Dr. E. G. Gowen was at once called. Dry food only was given for three days, and during the week the child was treated for bronchitis. The symptoms remained about the same for the week, except the coughing was more frequent and severe.

The child was brought to me April 7. On putting my ear over the sternum, a whistling respiratory sound was heard, and by means of the fluoroscope a shadow that might be caused by a nail was indistinctly outlined in the chest. The child was then anæsthetized by Dr. E. W. Whitney, and the accompanying radiograph taken. (Fig. 1.) It shows the head of the nail reaching down to the upper border of the seventh rib on the left side, the point reaching upward diagonally to the lower border of the fourth rib on the right side, hence the nail had entered the left bronchus head downward, and was lying behind the base of the heart

All the authorities consulted considered the removal of a foreign body from this location a very difficult problem, and gave a very high mortality.

Among other means for its removal, I thought of a magnet, and made inquiries of several so-called electricians to see if the idea were tenable, not knowing that any one else had attempted the magnet for this purpose. Recently I have noticed in the Annals of Surgery, December, 1902, that Dr. Brokaw, of St. Louis, had made an unsuccessful attempt to remove a tack by means of the

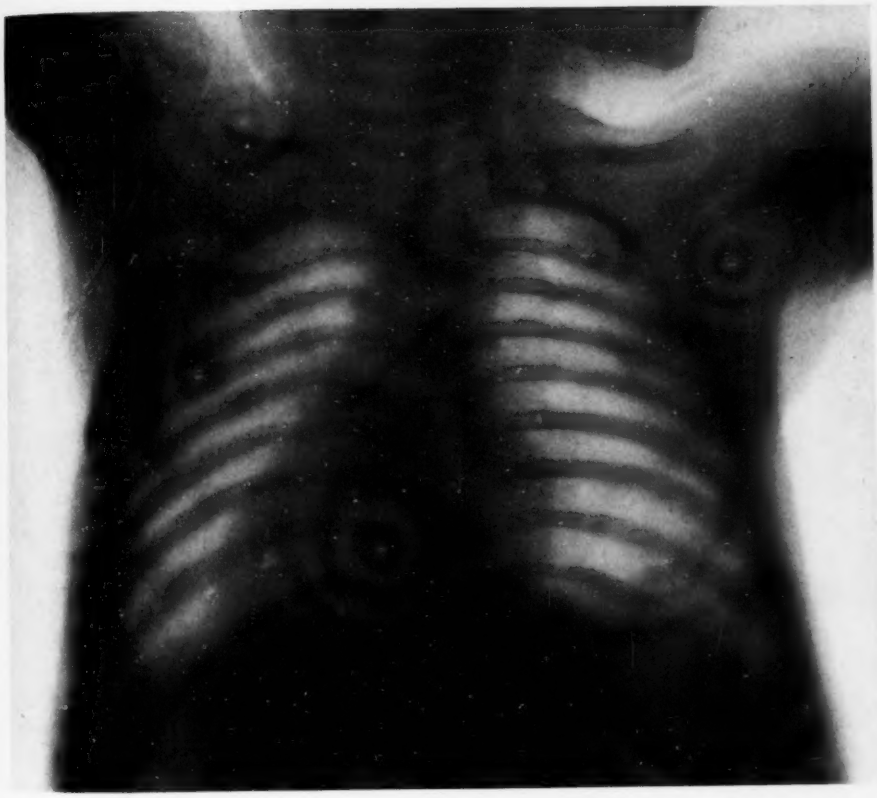

FIG. 1.—Shingle-nail lodged in bronchus.

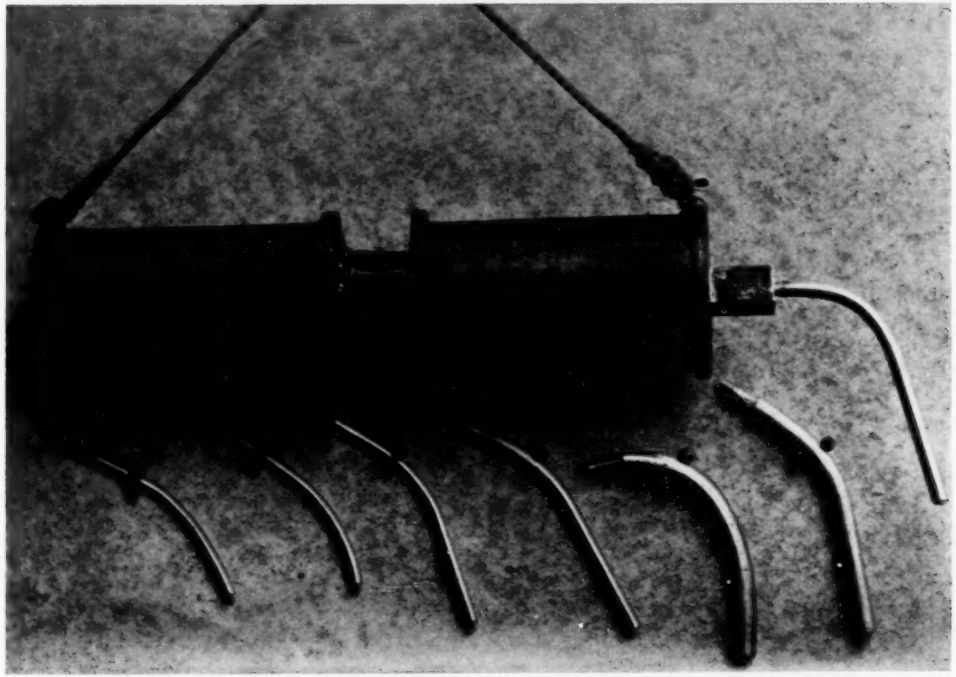

FIG. 2.—The Pfoutz-Godbe Magnet.

magnet from the bronchus of a child eight years old. But first to assure my skill in the mechanical method, I secured a dog, made a tracheotomy, put a shingle-nail head first into the bronchus, and attempted its removal by means of various ingenious instruments. I was unsuccessful; the dog died. I decided some other method must be used, and began to consider further the magnet. Dr. G. B. Pfoutz was consulted, to whom Dr. H. C. Deane presented a small electro-magnet secured from Dr. Baldwin, which Dr. Pfoutz took to Mr. Murray Godbe, an electric engineer with the Utah Light and Power Company, with whose collaboration was produced the electro-magnet shown in the accompanying picture. (Fig. 2.)

By means of this magnet, we were able to attract a shingle-nail for about two inches through space, and it required considerable force to detach it when once contact had occurred.

Accordingly, believing that this magnet would pull the nail from its bed in this little bronchial tube, on April 13, thirteen days after its lodging there, with Dr. Pfoutz's assistance, I made a low tracheotomy, and introduced the projecting tip of the magnet along the trachea down near to the point of the nail, and instantly, on the current being turned on, a distinct click, heard by all present, indicated that contact had occurred, and I gradually and carefully removed the magnet with the nail dangling on its point. I believe this to have been the first successful removal of a foreign body from a bronchial tube by means of a magnet. The wound was partially closed, and the child made an uninterrupted recovery.

We should be able to remove magnetic substances from the stomach and bladder by means of the electro-magnet, and it appears to me possible that in some cases, when the substance is in the trachea, or bronchi, a tracheotomy will not be necessary. The following description of the electro-magnet used in this case has been furnished by Mr. Godbe.

The magnet consisted of a Norway iron core, five-eighths of an inch in diameter and eleven inches long, on which was wound, in two sections, 6400 feet of No. 24 double cotton-covered magnet wire, making 9000 convolutions around the core, and having 160 ohms resistance.

It was designed for operation on 250 volt direct current, that

being the service available in your operating room. With that voltage there was passed one and one-half amperes of current, or 13,500 ampere turns around the magnet core. The end of the core was drilled and tapped to receive the Norway iron stems, a number of which were made in different sizes and shapes in order that you might select the one suitable for your operation. The one you selected and used in your operation was constructed of one-fourth inch Norway iron, and is the one attached to the magnet, and bent in the shape as shown in the photograph herewith. (Fig. 2.)

The number of magnetic lines that can be forced through a given cross-section of iron depends not only upon its quality or permeability, but upon its saturation. For instance, if a small number of lines are flowing through the iron at a given excitation, doubling the excitation will double the lines of force; when the lines reach a certain number, increasing the excitation does not proportionately increase the lines of force, and an excitation may be reached after which little, if any, increase of lines occurs with increased excitation.

Iron or steel used in magnetic circuits must be tested by sample before an accurate calculation can be made; and as the iron used in this magnet was no doubt thoroughly saturated, and also considering the magnetic leakage from the stem, accurate results as to the "pull" or "traction" of the magnet at its point could only be determined by actual measurement, which I find to be as follows: a lifting power at its point of 100 grammes, and a pull of ten grammes on the substance one-fourth inch from its point.

The use of this magnet in your operation has suggested to me the use of properly constructed electro-magnets in any case requiring the removal of magnetic substances from the body, and although my suggestion is along the line of the earliest discoveries, it might not be considered by those hurriedly called upon to construct a magnet for emergency use, as in your case, or those designing such a magnet in the shops.

We must conceive of a magnet in any shape having a definite circuit, that is, the lines of force passing from its north pole and entering its south pole. For many purposes this conception of poles is a very serviceable one; it is especially so when we have to treat of the influence which a magnet exerts throughout the space in its neighborhood, or throughout what is called the *magnetic field*. In this magnetic field the two poles will exert two forces,—one

tending to pull the particle towards it, and the other to push the particle from it. These two forces will have for their resultant a single force, which is the whole force exerted by the magnet on the particle, and will depend upon the amount of magnetic substance in the particle, and the number of magnetic lines embraced by the substance.

It will be seen, therefore, that any magnetic substance, to be attracted to the pole of the magnet, should be as near as possible in that portion of the magnetic field having the greatest magnetic density.

It has occurred to me that a large and powerful electromagnet could be constructed and mounted so as to be easily placed in any position relative to the body being operated upon, and having different sizes and lengths of flexible iron stems, attachable to the magnet core, for insertion into wounds or parts of the body for the removal of foreign magnetic substances. If this magnet is so placed that the point of its stem and the substance to be removed will be in the field of greatest density, I believe satisfactory results can be obtained.

REMOVAL BY GASTROTOMY OF A HATPIN SWALLOWED BY A TWENTY MONTHS' OLD CHILD.

BY ARTHUR F. HOLDING, M.D.,

OF NEW YORK,

Director, Röntgen-Ray Laboratory of the Cornell University Medical College.

THE following case was referred to the Röntgen-Ray Laboratory, Cornell University Medical College, by Dr. G. M. Ball, of New York City:

A female child, aged twenty months, on April 11, 1904, was playing on a bed with her mother's hat, in which there were three hatpins; the child was noticed to fall forward in her play. After awhile the mother lifted her from the bed and noticed that the child coughed a little; immediately thinking of the possibility of the little girl having swallowed something, the mother glanced about the bed, but felt reassured, as there had been seemingly nothing which the child could swallow. From that time on the patient held her body stiff when she stooped to pick up anything from the floor, also complained of pain whenever the body was bent. The third hatpin was missing, and on searching about the house could not be found. For three days following, the child's temperature ranged between 100°–101° F., accompanied by symptoms of bronchopneumonia. Examination of the throat revealed a few slight inflammatory areas, but no evidences of a foreign body.

On April 20, the right arm was noticed to be colder than the left, and this persisted until after operation; on April 21 the child passed a thin film of blood-clot in a stool. Two days later a skiagraph was made, the child's trunk being bare to avoid misleading images of pins in the child's clothing.

As can be seen in the accompanying radiograph (Fig. 1), the diagnosis was positive; it was evident that the child had managed to swallow one of the hatpins. The head of the pin

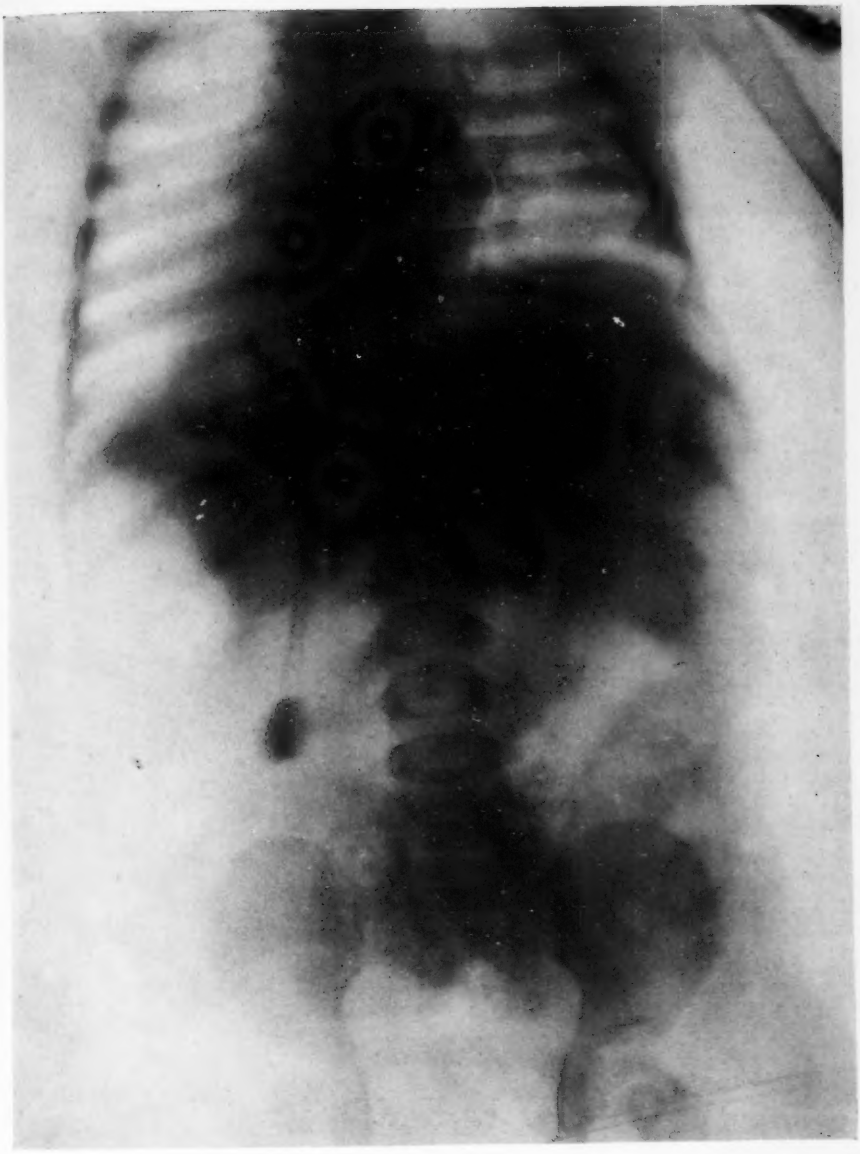

FIG. 1.—Location of hatpin.

being downward to the left of the spinal column opposite the intervertebral cartilage between the second and third lumbar vertebræ, and the point upward, to the right of the spinal column on a level with the second dorsal vertebra. Around the point is a shadow with a dense periphery probably due to a small hæmorrhage with beginning coagulation. (Similar shadows have been visible in other radiographs where the blood could be demonstrated. The shadow is not dense enough, nor of the right shape, to be that of some foreign body, as a button.)

On April 26 the case was referred to Dr. F. W. Gwyer, under whose service she was admitted to Bellevue Hospital. During all this time (fifteen days) the child presented no other symptoms than those mentioned; there was no vomiting, the appetite was good, bowels regular, and she slept well. On admission to the hospital, the temperature was 98.6° F.; pulse, 108; respiration, 24.

Gastrotomy was done within a few hours after the admission of the patient. Under ether, the head of the pin could be readily palpated through the abdominal wall about midway between the ribs and the pelvis, on the left side, under the outer half of the rectus muscle. A vertical incision was made through the rectus, but lower than the ordinary incision, with the idea of facilitating the withdrawal of the pin without bending it and so causing damage with the point. The stomach was opened and the head of the pin found pressed against the posterior wall of the stomach. It was necessary to pack a little gauze about it on each side so as to raise it sufficiently to catch it with the forceps; it was then drawn out with ease. The wounds in the stomach and abdominal wall were closed. The child made an uncomplicated recovery, being discharged from the hospital, May 8, 1904.

The most feasible explanation of how the child swallowed such a long pin is that she was playing with the head in her mouth, and on falling forward the point struck on the soft bed and the pin was driven head foremost down the œsophagus. The smooth, round head gliding down without injury, much as when an œsophageal bougie is inserted, the pin being too small in diameter to be grasped by spasm or contraction of the œsophageal muscles.

The case, I think, is exceptional in that the length of the

object is great, especially relative to the size of the child; there were so few symptoms and so little inconvenience during the pin's fifteen days' residence in the child, and in that so little damage seems to have been done to the œsophagus, pleura, and lung, some of which it probably punctured.

I wish to thank Dr. G. M. Ball, Dr. F. W. Gwyer, and Dr. R. M. Vose (Resident Surgeon, Bellevue Hospital) for the opportunity of observing and reporting this case, and also for their clinical observations and co-operation.

DETAILS OF THE TECHNIQUE OF A POSTERIOR GASTRO-ENTEROSTOMY.

BY CHARLES L. SCUDDER, M.D.,

OF BOSTON, MASS.,

Surgeon to the Massachusetts General Hospital.

THE preliminary preparation of the patient, the isolation of the operative field, the selection of the places in the stomach and the intestine for the anastomosis, the use of rubber-covered clamps, the rapidity of suture without the use of needle-holder, the employment of relatively large needles, the continuous suture, the use of the Pagenstecher linen thread, the very careful attention to every step, absolute cleanliness, absolute hæmostasis: these are the details which mark a new era in the development of the technique of gastro-enterostomy. The operation is consequently attended, to-day, with little if any risk to the individual patient.

Wölfler's method of performing an anterior gastro-enterostomy is of service in certain selected cases, particularly those of malignant disease and of ulcer of the stomach in which the posterior operation is not feasible because of adhesions or infiltration of the stomach wall. It is coming to be recognized by those who are doing stomach surgery, both upon the Continent, in England, and in America, that the nearer to the origin of the jejunum the anastomosis with the stomach is made, the more satisfactory is the convalescence and subsequent course of any individual case. In only one clinic which I visited the past winter (that of Krause) did I find the anterior operation still being used as a routine procedure. In the clinics of Kocher, Czerny, Mikulicz, Von Eiselsberg, Körte, Kümmell, Witzel, Hartmann, Robson, and Moynihan the posterior operation is the operation of choice, each of these surgeons, of course, varying the details in some particulars.

Kocher's method of doing a gastroduodenostomy is advantageous because the exit from the stomach is made proximal to the bile and pancreatic supply. It is a physiological opening that is secured.

Finney's gastropyloduodenostomy is similarly physiological. In my opinion, each of these latter procedures is theoretically, and I surmise practically, preferable to the posterior gastrojejunostomy. Whether the anatomical and physiological results are better after division of the pyloric sphincter or following the gastroduodenostomy of Kocher is yet to be determined. The mobilization of the duodenum after Kocher's suggestion is ordinarily possible.

The patient's mouth and teeth, several days previous to the gastro-enterostomy should be thoroughly cleansed by brush and swab and alkaline wash. For three or four days before operation, the patient should be placed upon a restricted diet. This diet should consist chiefly of liquids and soft solids which do not leave much residue. Twenty-four hours before operation, the diet should be restricted to liquids which have been sterilized—either sterile milk or sterile bouillon. The intestine should be empty, so as to secure to the operator, after the abdomen has been opened, as much room as is possible. Gentle gastric lavage should be made, when not contraindicated, each of three mornings previous to the operation, and again the day of the operation. An empty sterile stomach is a desideratum. Preparation of the skin of the abdomen in the region of the operation should be very thorough. The umbilicus should be especially cleansed. There should be no antiseptic used on the skin the morning of the operation. The skin should be washed with sterile salt solution or with boiled water just previous to operating.

The technique of a posterior gastrojejunostomy, as I am doing it to-day, without a loop is as follows: An ample incision is made through the middle of the belly of the right rectus abdominis muscle. All bleeding points are ligated before incising the peritoneum. A long incision is more desirable than a short one. The technical details of the operation proper are facilitated by an easy exposure of the parts. More thorough inspection is possible through the long incision. Upon opening the abdomen the duodenum and the whole of the stomach should be examined carefully, in order to detect possible lesions. The gall-bladder, the transverse

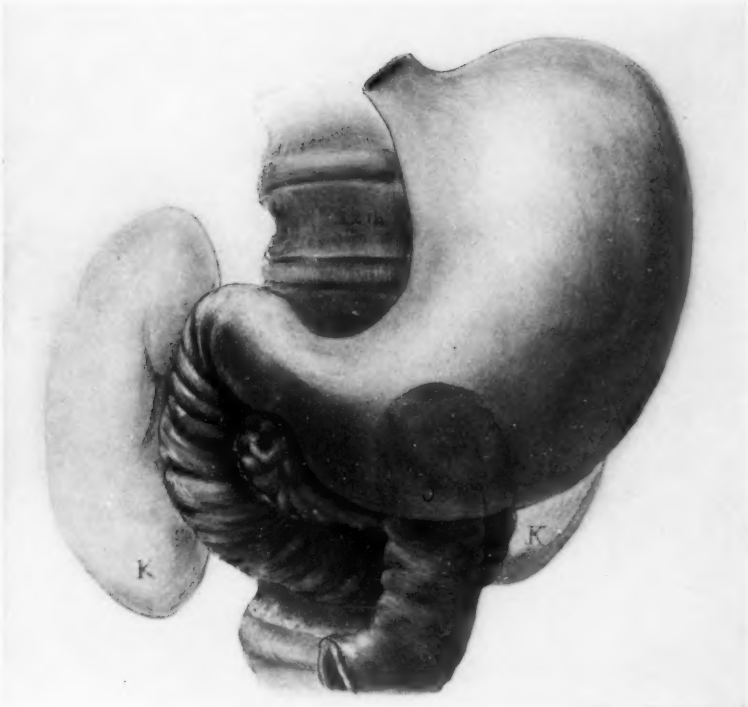

FIG. 1.—To show the relation of the beginning of the jejunum to the posterior wall of the stomach under normal conditions.

Note the tortuous course of the duodenum. Note that the natural place for the anastomosis between stomach and jejunum is where the jejunum rest against the posterior gastric wall.

FIG. 2.—To show the beginning of the jejunum and the peritoneal fold above the superior mesenteric vessel. To show the method of grasping with the left hand the transverse colon and the pushing the posterior stomach wall through the small rent made in the transverse mesocolon. The colic vessels supplying the colon are shown, as well as the vessels of the greater curvature of the stomach.

The omentum is purposely omitted from the drawing.

A line connecting the two points *x* and *y* indicates the best angle at which to apply the clamp to the stomach.

colon, particularly the hepatic and splenic flexures, the pancreas, and the appendix should be especially palpated and their conditions determined and recorded.

The great omentum and transverse colon are lifted completely out of the abdomen at the upper angle of the wound, placed upon a sterile towel covering the sterile abdominal skin, thus exposing the under surface of the transverse mesocolon. While the left hand grasps the transverse colon and omentum, the fingers of the left hand push the posterior wall of the stomach, in its pyloric portion, firmly against the mesocolon. The right hand incises with a knife the transverse mesocolon, thus exposing the posterior wall of the stomach. (Fig. 2.)

This incision is so placed that large vessels are avoided. Its direction is at right angles to the transverse colon's long axis. The incision is enlarged by gentle tearing of the mesocolon. The pressure of the left hand forcing the stomach through the mesocolon assists in the enlarging of the opening in the mesocolon to the required size. The opening in the transverse mesocolon should be some four or five inches long. If by chance there are any bleeding vessels at the edges of the mesocolon opening, these should be ligated. The large colic vessel, which nourishes the transverse mesocolon (Fig. 2), should of course be carefully avoided.

The posterior wall of the stomach is picked up by two pairs of dissecting toothed forceps, thus freeing it from the anterior wall of the stomach which is being pressed against it, and the stomach clamp, as suggested by Littlewood (London *Lancet*, November 3, 1900, page 1276), is applied. The clamp should be placed so as to avoid including, as far as possible, many large vessels. It must be remembered, however, that the large vessels mark the lowest border of the greater curvature of the stomach. This clamp is applied so as to compress the walls of the stomach sufficiently to prevent bleeding and exit of stomach contents. The clamp is placed a little obliquely upon the stomach, in the line joining "x" and "y." (Fig. 2.)

This oblique position is advantageous, according to Moy-

nihan, for upon replacing the stomach and jejunum in the abdominal cavity after the anastomosis is completed, the incision in the stomach lies most naturally against the jejunal incision without undue traction. (See Fig. 1, illustrating anatomical relations of the parts under consideration.) The beginning of the jejunum is next sought a little to the left of the spinal column and at the attachment of the transverse mesocolon. The jejunum is picked up by two pairs of toothed forceps, placed opposite the mesenteric attachment, at that distance from the peritoneal fold, marking the beginning of the jejunum, which is suitable to the case in hand. The nearer to the beginning of the jejunum the anastomosis can be made the more satisfactory will be the result. The clamp is placed longitudinally upon the jejunum opposite to the mesenteric border. The anastomosis is made so that the peristaltic movement of the jejunum occurs in the same direction as the peristaltic movement of the stomach. The clamps upon the stomach and upon the jejunum are placed alongside of each other, thus bringing the parts of the stomach and jejunum to be anastomosed into close apposition, entirely outside the abdominal cavity (Fig. 3).

The omentum and transverse colon are now, if possible, replaced within the abdomen. Two layers of gauze sponge or two layers of towels are placed beneath the clamps so as to protect the underlying tissues. A gauze sponge is placed between the two clamps, thus protecting the area to be anastomosed immediately behind the gut and stomach. (Fig. 3.) It is wise to have the sterile towels wet with hot normal salt solution.

The first, or peritoneal, suture is now taken with curved needle and No. 3 Pagenstecher linen thread. The suture is started at a point farthest from the surgeon and is made towards the surgeon. The suture includes peritoneum and muscular coats. The Cushing suture is used. The initial end of the suture is left long. The curved needle * is of such a size

* I am using a needle made for me as a modification of Moynihan's needle. It is long, and so curved that it may be grasped by finger and thumb firmly without needle-holder, and it picks up just enough tissue to be efficient.

FIG. 3.—To show the clamps applied to the stomach above and to the jejunum below. Note the angle at which clamps are applied. Note the strip of gauze between clamps posteriorly. Note the first half of the peritoneal suture being taken. Note that the suture is not drawn as tightly as usual in order that it may be seen in the drawing.

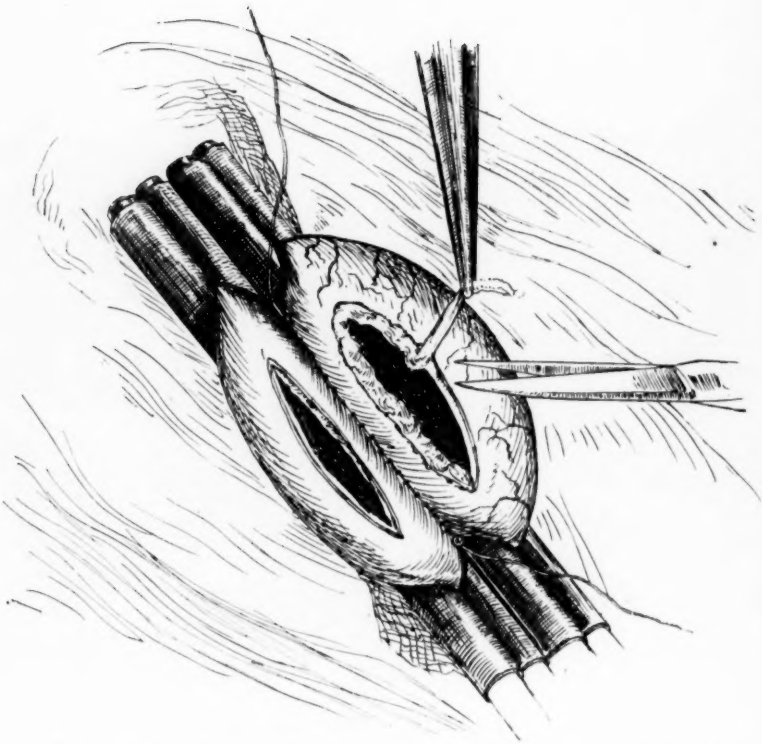

FIG. 4.—To show the removal by scissors of the prolapsed mucous membrane of the stomach, after the incisions into the stomach and intestine. Note that the mucous membrane from the jejunal opening has been already removed. Note that enough is removed to make the peritoneum and mucous membrane level. The first half of the peritoneal suture is shown completed. The gut is seen grasped by the clamps at the mid-portions of the blades of the clamps to secure evenness of pressure.

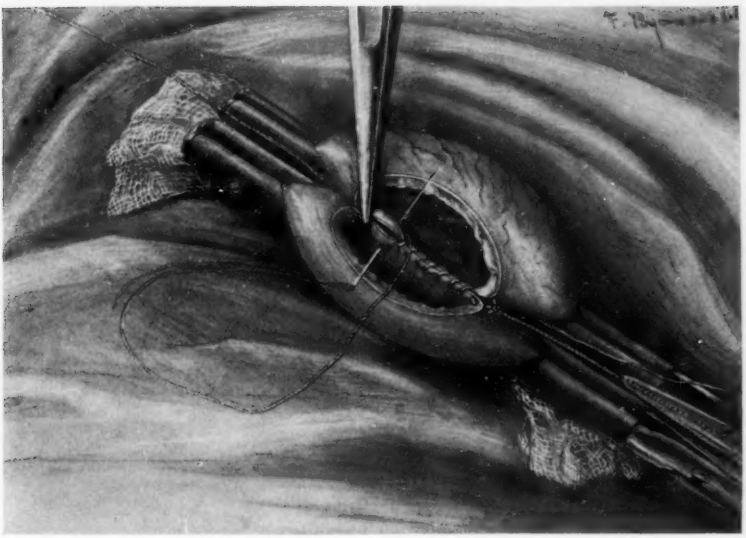

FIG. 5.—To show the taking of the first half of the through-and-through or hæmostatic suture.

Note at the beginning that a seroserous suture is taken and tied, that then the needle passes into the gut and then through and through all layers of both intestine and stomach walls. It is an over-and-over, through-and-through continuous suture.

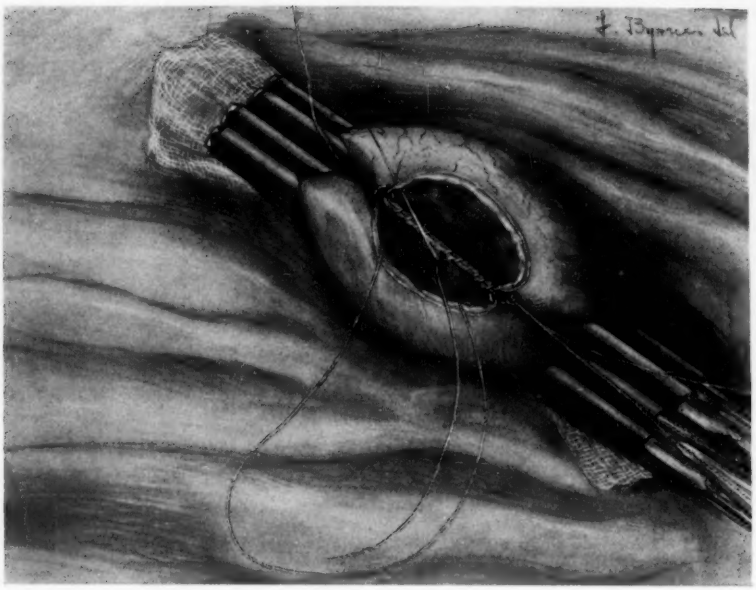

FIG. 6.—To show the second half of the second or through-and-through suture.

The needle passes always from mucous membrane to peritoneum on one side to peritoneum and mucous membrane upon the other side, and then the peritoneal surfaces are always brought into apposition. Note the needle is beginning the return suture.

that it may with ease be used without a needle-holder. Speed is thus gained in suturing. Having completed the first half of the peritoneal suture, the thread is left long, the needle and thread being covered by a wet gauze sponge. This insures complete protection to the suture from infection.

The stomach and jejunum are next opened by a knife incision, parallel with the line of suture just completed. The incision in the jejunum is therefore a longitudinal one. [The transverse incision of Mikulicz and Kocher limits the size of the opening.] The incisions are placed about one-half inch from the line of peritoneal suture. The stomach and jejunum having been opened by the knife, the opening is completed by the use of scissors. The size of the opening made will depend upon the physical conditions present. An opening of from two and one-half to three inches is ordinarily needed. Intestinal contents and stomach contents are carefully removed by tiny gauze sponges at hand for this purpose. By the use of a large sponge the peritoneum is more liable to be soiled. Usually, only a few drops of stomach or intestinal contents present after the incision is made, and are readily removed. Soiling of the peritoneum is precluded. The prolapsed mucous membrane of both the stomach and the jejunum is excised, as suggested by Littlewood (London *Lancet*, November 3, 1900, page 1276), by means of scissors, so that the mucous membrane is level with the peritoneum. (Fig. 4.) This is done to facilitate subsequent suture and to preclude the possibility of slight valve-like obstruction to the lumen of the anastomotic opening. The mucous membrane thus removed should be preserved in a sterile receptacle (a culture tube or sterile gauze), and should be examined microscopically.

The first half of the second suture is now taken with a straight No. 6 milliner's needle and No. 3 Pagenstecher thread. These large, straight needles are most useful. This suture is begun by taking a peritoneal and muscular stitch through both stomach and intestine. (Fig. 5.) The needle is then carried into the lumen of the bowel and through and through all coats of both jejunum and stomach, in an over-and-over continuous suture. Great care must be exercised that the

through-and-through suture includes always the mucous membrane of both stomach and jejunum. If this is done, hæmorrhage is almost impossible. Upon reaching the end of this suture, the needle is carried out from the lumen of the bowel through the peritoneum and tied to the initial peritoneal stitch. Thus peritoneal surfaces are brought into close contact throughout this whole suture. This through-and-through suture serves not only to secure peritoneal approximation over quite a broad surface, but serves as an hæmostatic suture. This continuous through-and-through suture may be interrupted once or twice, as suggested by Littlewood.

Both clamps are now loosened. One of the clamps is removed. The other is left in place, but open, that it may serve as a shelf upon which the bowel and stomach may rest and not slump into the abdominal cavity, as suggested by Munro. (Fig. 8.) Upon loosening the clamps, if there are any bleeding points noticeable, these are secured immediately by a curved intestinal suture. Ordinarily no ligature is required. The lumen of the gut and stomach now being closed, and all possibility of soiling the peritoneal surfaces being eliminated, the whole region should be wiped with sponges wet with hot salt solution, the towel uppermost should be removed, thus leaving the clean second towel exposed. The gauze sponge which lies between the clamps and is behind the suture line is used to make traction upon the anastomosed part and assists in exposing the posterior suture line to inspection. [Moynihan.] Having inspected this part and determined that there is no bleeding, and wiped it thoroughly, this posterior bit of gauze is withdrawn.

The second part of the peritoneal stitch is now completed. The whole field of operation being absolutely clean, the edges of the opening in the mesocolon are sutured to the posterior wall of the stomach in two or three places, by single interrupted Pagenstecher sutures. This prevents contraction of the opening and consequent subsequent constriction of the gut. This suture also prevents a hernia of the small intestine into the lesser cavity of the omentum. There is also less likely, because of this suture, to be a kinking of the gut. The distal

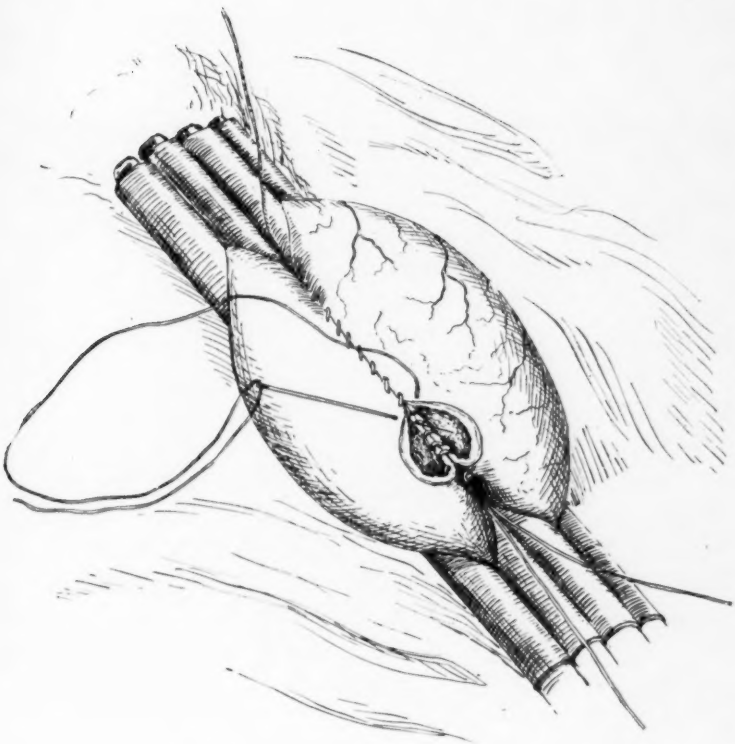

FIG. 7.—To show the completion of the second half of the through-and-through suture. Note how the opening has been gradually closing. Note the needle finishing the stitch. Note, that to finish suture ideally the needle passes through peritoneum last, and is then tied to the first peritoneal suture used at the starting place. See figure. Thus peritoneal surfaces are brought into contact.

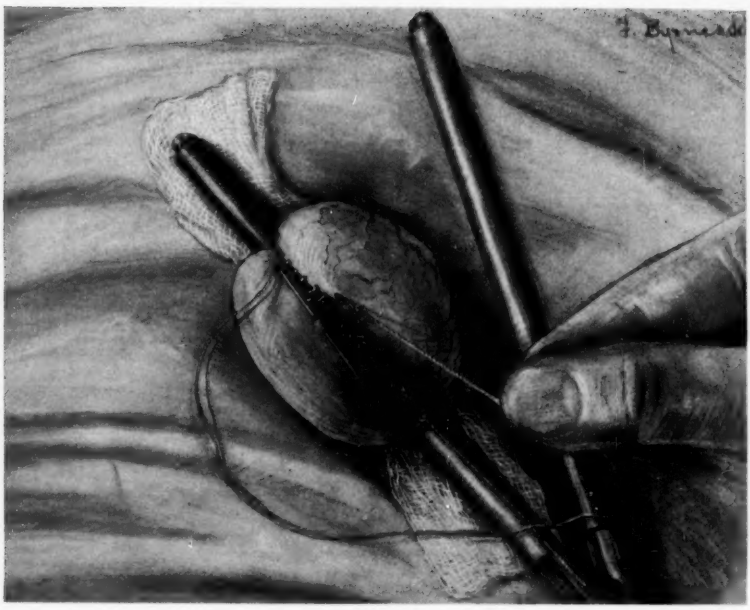

FIG. 8.—To show the second or through-and-through suture completed. To show the second half of the first or peritoneal Cushing suture. Note that the clamp upon the jejunum has been removed. Note that the clamp upon the stomach has been loosened, but that one blade has been retained to serve as a shelf to hold the part well without the abdomen, and thus to prevent slumping of the part until the suture is completed and the parts are cleansed finally.

FIG. 9.—To show diagrammatically the location of the opening secured by this operation between the stomach above and anteriorly and the jejunum below and posteriorly. S indicates the stomach cavity. I indicates the intestinal lumen.

portion of the jejunum is now replaced in its natural position, whatever this may be in the individual instance, usually it is to the right of the spine. The omentum is replaced, covering all. The abdominal wound is closed. The patient, on the second day, sits in a semirecumbent posture to facilitate the passage of stomach contents into the intestine.

Treatment subsequent to operation. Nutrient enemata, small in amount, every eight hours may be used for forty-eight hours. Nothing is given by mouth for twenty-four hours, then liquids are given in small quantities at frequent intervals. The amount of nourishment taken by mouth in the third twenty-four hours is gradually increased, until at the end of a week soft solids and minced beef and chicken are allowed.

Of all gastrojejunostomy operations, the technique as described in this communication seems to me to be the most speedy and simple of performance. Risk from infection is completely eliminated. The occurrence of any obstruction (a vicious circle) is most unusual following this technique. Personally, I have had no cases of vicious circle.

Three questions are yet unsolved in connection with the operation of gastro-enterostomy. (*a*) The permanency of the artificial opening when the pylorus is patent; (*b*) the desirability of permanency; and (*c*) the likelihood of an ulcer forming in the jejunum. Roux's method has been followed in a few instances by a peptic ulcer in the distal loop. Roux explains this very reasonably by saying that in the peptic ulcer cases the proximal loop has been anastomosed too far from the stomach opening. He has personally had no such ulcers form because he has joined the proximal loop to the distal loop near to the stomach. The bile and pancreatic juice thus are enabled to neutralize any deleterious effect of the acid gastric juice. I believe that if the anastomosis with the jejunum is made close to its origin, as indicated in the above technique, the slight danger from peptic ulcer will be eliminated. Kocher's gastroduodenostomy and Finney's gastropyloduodenostomy, with slight modifications in the technique as described by Finney, appeal to me physiologically, when anatomically possible of execution, as ideal operations.

GANGRENE OF THE HOLLOW VISCERA.[1]

A REPORT OF THREE CASES, WITH ILLUSTRATION.

BY VERTNER KENERSON, M.D.,

OF BUFFALO, NEW YORK,

Attending Surgeon to the Erie County Hospital, the Emergency Hospital, and Instructor in Clinical Surgery in the University of Buffalo.

On March 26, 1902, I was called by Dr. Hugh McIntire, of this city, to see with him and with his colleague, Dr. John C. Thompson, also of this city, Mr. E. M., a collector at one of the local stations of the frontier.

This man had been a politician for a number of years and was justly popular among his friends. He had been a heavy drinker, or one would say he had been a steady drinker of perhaps five or six drinks of whiskey per day. He was a robust man, weighing about 175 pounds, and had always enjoyed apparently good health. He had been for years troubled with constipation, and had tried various remedies for the cure of the same.

Prior to my consultation with Dr. McIntire and with Dr. Thompson, the man had after some little dissipation and an extra fit of constipation remained at home for several days, suffering from slight nausea, vomiting, and diarrhœa, but had been about the house. He had, however, the day previous to my visit, decided that he was well enough so he could return to his work at the office, and so announced to the attending physician, and he had gone to the office.

He had, however, to return home because of the distress in his abdomen; shortly after his arrival home, he was taken with very severe pains, and, although he suffered intensely and was advised that he needed surgical interference, he refused to have me called until twenty-four hours later, and then he was not suffering so much pain, but he had been given liberal doses of opiates. On March 28, 1902, I found him with a temperature of 99.5° F., with a pulse of 140, and respirations were 20. He had evidently been in

[1] Read before the Medical Union of Buffalo, New York.

great distress. His face was covered with beady perspiration, and he was blanched somewhat, but was not dull or apathetic.

His abdomen was immensely swollen and he was tympanitic. A few hours before I saw him he was very sensitive all over the abdomen to any manipulation or examination, but complained of a very severe and constant pain in the epigastrium. No localized pain in the region of the appendix. When I examined him, he would allow, either on account of the opiates that he had had, or on account of bowel paralysis, a palpation, and that without evidence of pain that was intense.

The general symptoms were so marked that at the time I was not at all sure that the trouble was not appendicitis, even though the previous history was indefinite and the immediate history gave the epigastrium as the seat of the greatest pain, and that the general peritoneum had when I saw him become involved, and that he was beyond hope of operative interference. After consulting with the doctors, although he had refused, for the twenty-four hours previous, to have any operative interference, when assured by me that his chance of recovery was commensurate with the speed with which surgical interference was undertaken, and that his condition without operation was entirely hopeless, he agreed, and was sent to Riverside Hospital, where I operated as soon as he could be prepared.

A six-inch incision was made in the epigastrium, because that was the point where the pain had been most pronounced. As soon as the opening was made into the peritoneum there flowed out a large amount of serous bloody fluid. This fluid was purulent, was not yellow, but was as described, serous and somewhat streaked with blood.

Examination showed that the greater part of the small intestine was normal in appearance and feeling; that the colon was not involved, was not distended; that there were not adhesions of one coil of intestine to another, was no localized point of inflammation, and no abscess cavity " walled off."

A part of the small intestine was found to be very much inflamed, and for a space of about twenty-six inches was almost in a necrotic condition. Eighteen inches of the gut, which was practically black, were resected.

This small intestine was of darker color than is usually encountered in cases of strangulated hernia. It was necrotic, but did

not have the same black color as would be found in dry gangrene involving the external skin, where the necrotic area shows jet black. This was a condition of moist gangrene.

The omentum which was pushed up showed no pathological indications. It was not adherent. The mesentery, however, was swollen, hard, filled with nodules varying in size from a pea to that of a pigeon's egg. The mesentery supplying the whole area of necrotic intestines was involved. It is usually easy to turn the coils of the intestines from side to side, that is, in normal peritoneal cavities the mesenteric attachment forms no obstacle to the manipulation necessary to make a full and complete exploration. Not so in this case. Any attempt to move the coils involved was met with such resistance from the mesenteric attachment that it seemed almost brittle, and one was constrained to use care lest disruption of the bowel should occur.

The caliber of the bowel in general was increased, but the thickness of the bowel wall was several times over-increased. The lumen was empty, save for the serous fluid which surrounded the part involved, and which evidently came from the bowel and the mesentery. With great care the incision was retracted, the gut lifted, examined, the limitations determined, and the resection performed, removing about eighteen inches of the blackest gut. A medium-sized Murphy button was placed in position and the large amount of omental surface that was cut through as the necrotic gut was severed was tied off with medium-sized catgut, and then sewed "over and over" with fine catgut.

The place where the Murphy button was inserted was reinforced with twelve fine Lembert sutures of fine silk, and the whole was closed up. The external wound was closed with silkworm gut, but several drains of iodoform gauze were left *in situ*.

The small intestine that was not involved by this necrotic area looked perfectly normal, was reddened but little, even though the whole abdomen was filled with the serous fluid, and although the intestines were all distended by flatus. The necrotic areas were dark, cyanotic, reddened, and in the worst part were blackened, and the circulation was evidently entirely shut off.

The mesentery was much swollen, very hard, and seemed to be filled with nodes. Usually, the mesentery is soft, very pliable, and can be pulled about to examine the intestines and to see the different sections of the gut that are under discussion. In this

instance the swelling was so great in the mesentery that the gut could not be moved without rupturing the peritoneal covering of the mesentery.

The mesentery was swollen in nodular masses, and the whole looked or rather felt like the nodes that appear in a rapidly growing cancer, say of the breast, but of course was all injected with the reddening of the general peritonitis. When the hæmostatics were thrust through this swollen and much injected mass of mesentery, as was done in the tying off of the mesentery preparatory to the removal of the necrotic gut, there was little bleeding, but a considerable oozing of a kind of serum from the ruptured peritoneal coating and from the places where it was cut through.

The general appearance was as if there was cancer of the mesentery and following necrotic area of the gut. Examination of the nodes, however, with the microscope did not show any cancerous growth, but the appearance was of a very much inflamed and overswollen area of mesentery. The patient died six hours after the operation.

This man had no specific history; he had been married and had three beautiful and healthy children. He had never had any skin trouble of any kind that might be mistaken for specific trouble. His wife and children are still living in the city, and are all well and healthy. His arteries were hardened to some extent, and he had a resistant impulse at the radial, but the artery could be compressed so that the current could be stopped. He had been a steady drinking man for years, and yet was never intoxicated. The appendix was examined, and there was nothing to lead any one to believe that there had been any origin of the trouble at that point.

The second case was a patient of Dr. C. M. Brown, of this city, who asked me to see him in consultation with him, giving me the following history:

J. P., forty-five years old, and a cooper by trade; weight, 140 pounds when at work and in fair health. Previous history.—Discovered that he had syphilis about one year ago, and has not had regular treatment since that time, but has taken enough, so that there was no eruption evident on the skin at this time. He had some inflammatory condition of the bladder about six years ago..

The patient was taken sick about one month ago, and has had nausea since that time, gradually getting into such condition that he had not retained anything on his stomach for more than a few minutes for four days. Has had twenty-seven stools in the twenty-four hours previous. He was in great distress, although he had been well supplied with opiates during that time. His temperature was 98° F.; pulse, 72; respiration, 18. The pulse was soft, weak, but regular. The vomitus was the water and fluid recently taken and streaked with mucus and blood. The stools were remnants of liquids taken by bowel for nourishment, yellowish and foul smelling. No solid particles, no blood in stools I saw, but there had been some traces.

His face had the typical abdominal distressed appearance. He had emaciated a great deal in the period of his sickness, and had tried, and very intelligently, all the remedies for nausea, and, finally, had had a period of rest for several days of the stomach, and has been fed by bowel, but had not retained anything in the bowel for some hours. Physical examination showed a tympanitic abdomen, very tender, and greatly distended. Nothing could be made out by palpation, as there was a high degree of distention.

With practically normal temperature, pulse, and respiration, yet the general appearance of the man indicated that he was in a critical condition. His face was the picture of distress, and was somewhat reddened, cheeks sunken, eyes bright, intellect unimpaired. There was a beady perspiration over his face and his body was clammy. He could move himself about in bed with difficulty.

Believing that he had a gastric ulcer or acute pancreatitis, he was at once transferred to the German Deaconess Hospital and was prepared for operation, which was undertaken the next morning.

He appeared in the morning as he did the night previous, much distressed, and complaining of the great pain in the abdomen; his tongue was dry and the abdomen was distended. I was assisted by Dr. Brown and Dr. Swertfeger. He was given chloroform at first after a few breaths of ethyl chloride, but it was necessary to change to ether after a few moments, as he did not do well under chloroform.

When he was fully narcotized, the abdomen could be palpated; then it was quite evident that the trouble was in the epigastric region rather than below the umbilicus, and accordingly an incision

was made in the median line of the abdomen and the peritoneal cavity was opened for about five inches. As soon as the cavity was opened there flowed from it a small amount of serous fluid, not having the appearance of purulent material, but of a serosanguineous tinge.

There presented immediately under the opening a coil of intestines, which in size would be considered as the colon, but which on examination was found to be small intestine and somewhat enlarged, but the intima showing more thickening than actual enlargement of the diameter of the gut. This was very much congested, almost black, and extended from one end to the other of the necrotic part, about sixteen inches.

The lumen of the gut was not entirely occluded, as it was evident that a certain amount of fluid was being passed along.

I attempted to lift the swollen and necrotic part, but found that the mesentery attached was also so very much thickened that it was not at all flexible, but was so gorged with the inflamed condition that, even when only slight and very gradual movements were made, the peritoneal covering of the mesentery began to bleed. There was some tearing. I examined very carefully, and did not find any evidences of pus in the peritoneal cavity. The gall-bladder was not distended, was not inflamed, was not occluded. The appendix was not inflamed, and there was no evidence of any involvement of the colon at any place. The pancreas was soft and not at all inflamed. The stomach was not attached by adhesions to the place where the gut was inflamed, and there was no evidence of perforation.

This was the second case I had seen, and, knowing that this man was not in good condition, I made careful examination of the surrounding parts and sewed up the wound in the abdomen, returning the man to bed, giving, of course, a very unfavorable prognosis in the case. The man lived until the next day.

In this case, as in the first case cited, the mesentery was hardened into many nodes, which filled the whole width of the mesentery and made it very hard, and not the usual œdematous feeling encountered in the intestine.

The intestine involved is well illustrated in the accom-

panying sketch (Fig. 1), being so nearly black that it was necrotic to all intents and purposes. The whole length of the necrotic mass was delivered after a careful effort; but it was so involved with all the surrounding mass, it was quite out of the question to attempt its removal.

The nodes looked like carcinomatous nodules, but the liver was not involved, and primary carcinoma of the omentum is, of course, unknown, and is seldom found in the mesentery, and then unless extending from the involved organs near at hand.

The first case had at the time I saw him first no temperature, but had a pulse of 140, while this man at no time had either any increase in the pulse or in the temperature. When he was admitted to the hospital his temperature was 99° F., and his pulse was 76.

They were both undoubtedly cases of gangrene of the intestine following thrombus of the mesenteric artery, or rather the branch that supplied this part of the intestine. There was a well-marked line in both instances; the greater part of the intestines were of normal color and consistency. The colon was in both cases normal in appearance, and in neither case did there appear any blood in the vomitus or in the stools.

In one case there was a well-recognized case of syphilis, and in the other case the arteries were hardened, and the man had been a steady drinker for a number of years. In each case there had been a period of sickness preceding the attack, each had been constipated, each had a period of gastritis followed by intense abdominal pain, vomiting, tympanites, distention, tumefaction, both presented the same appearance of the bowel, one was resected and one was not, and both died.

The third case presented the same appearances, but had a different etiology, and was a more favorable subject.

On November 4, 1902, I was asked by Dr. C. M. Brown to see with him Joe F., aged nine years, the eighth healthy child of healthy but hard-working parents. At the time I saw him he gave no history of injury, but it was stated to me (as it had been to Dr. Brown before me) that the boy was all right four days before this,

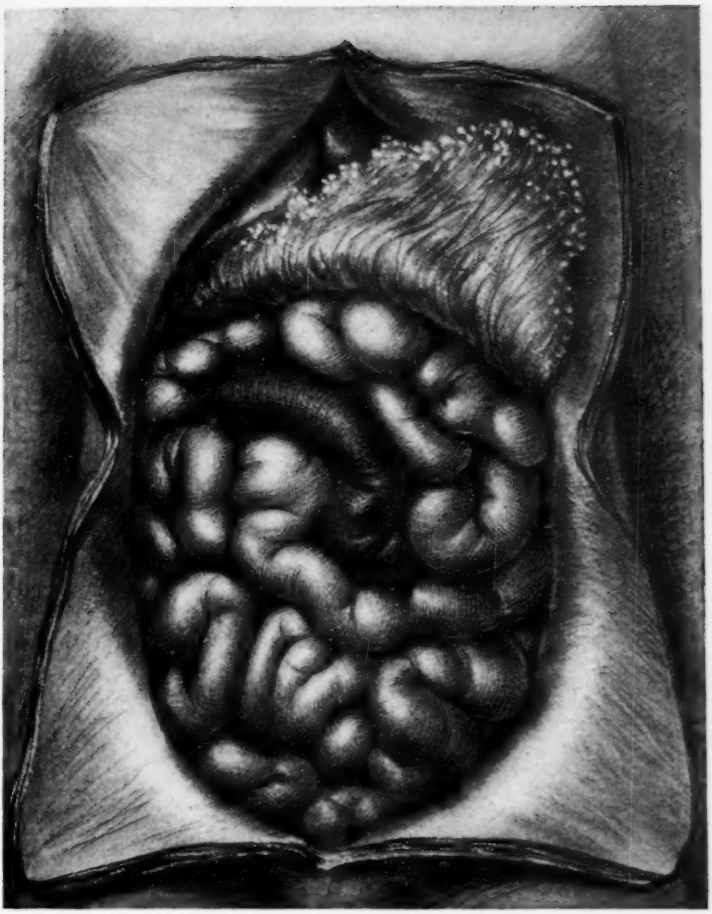

FIG. 1.—Illustrating the appearance of the abdominal cavity in Case II, in which one coil of the small intestine was totally black, and yet was surrounded by other coils of normal color.

when he suddenly was taken with the colic and his abdomen became very sore, and his every movement was a source of pain to him. Dr. Brown had treated him by giving him anodynes for a short time until the great prostration had worn away, and then he had given him a liberal portion of physic, and he had apparently improved, until the day previous to my seeing him, when he had developed great tenderness in the abdomen.

He had vomited a great deal and was very tender all over the abdomen; there was no rigidity of the muscles, and no localized tenderness except that perhaps a little more tenderness was shown over the umbilicus. I might say here that after the operation the boy seemed in a precarious condition for some time, and there was not forthcoming an explanation of his condition, and the boy's grit was somewhat weakened by his suffering. He confessed to his mother, that the day before he was taken sick he had purloined the football of some of his playmates, and that after it was discovered, two of them caught him in a lonely field, threw him down, and, while the one held him, the other kicked him with all his might in the "belly" several times, and that it was after this experience that he staggered home with the attack of colic, but he was game and did not "peach" on the other boys, either on account of his own wrong-doing or on account of his idea of "grit." I had him sent at once to the "Sisters' Hospital" and prepared for operation, and with the assistance of Dr. Brown and Dr. Riley I opened the abdominal cavity, and in this case as in the other cases found about eighteen inches of the small intestine very much blackened, necrotic in places, but with the colon intact and not at all involved.

The appendix was a little reddened, but was not involved. The mesentery was in this case, as in the others mentioned, much swollen, thickened, and hard, the lumen of the gut was not increased in diameter, but the walls were much injected, full of serum, blood, and not of pus.

The boy at the time I saw him first had a normal temperature, but a pulse of 120. The appendix was not removed, a bad prognosis was given, but the boy got well and is well to-day.

He had stormy passage, was out of his mind for several weeks, had incontinence of urine and fæces, tore his wound open, passed bloody mucus by bowel for some days, rejected all food, and in general was not promising, but eventually began to keep liquids,

gained some control of his bowels, the bedsores improved, the general tone improved, and finally he was moved home, and after a tedious delay was restored to health and is alive to-day.

I believe all three of the above cases were caused by a thrombus of the artery of the mesentery. The first from a sclerotic artery, consequent on his long alcoholic history, and perhaps from an undiscovered specific taint; the second from sclerotic artery from specific taint with some slight injury from the work which he followed, being a cooper, or perhaps from the gastritis and general indisposition under which he had labored for the month previous.

The third from the traumatism resulting from several vigorous kicks in the abdomen administered by his boy friends.

I have seen several men in hospital practice who have died from severe injuries resulting from having heavy bodies fall on them or from having fallen great distances, and the certificate has usually read " internal injuries," and it is usually conceded that this means rupture of the spleen or liver.

However, after seeing these three cases, I am convinced that there are many cases where death is caused by gangrene of the intestine following thrombus, or embolus in sclerotic arteries, and a long alcoholic history, or syphilis coupled with some slight injury or gastritis, or, as in the third case following, extensive bruising of the abdomen. The drawing herewith presented (Fig. 1) was prepared under my direction, and presents the appearance of the first two cases very well.

There was one coil of the intestine that was black; and when further exploration was made, it was seen that the coil extended among the other coils; but as the abdomen was opened, the one black coil was of such appearance in comparison with the rest as the illustration shows.

RESULTS IN ABDOMINAL WALL SUTURE.[1]

BY CHARLES DAVISON, M.D.,

OF CHICAGO.

AFTER a laparotomy, the abdominal wound to be ideal must be neat in appearance, accurate in apposition of tissue, sterile in healing, and strong in the resulting scar.

Some time ago the writer proposed the fastening of a longitudinal silkworm-gut suture in the fascia of the abdominal wall by terminal bow-knots, leaving the ends of the suture protruding from the wound. The knots to be untied by traction on the exposed ends and the suture removed at the completion of the process of healing.

A complete series of forty-one consecutive cases with sterile primary union was reported at that time.[1]

The aim of this simple manipulation was to obtain all of the advantages and security of close and accurate suture of the individual layers of the abdominal wall without the danger of suppuration incident to the use of catgut and its pulpification and absorption, and without the dangers of irritation and sinus following the use of any permanent buried suture. Silkworm gut can be made absolutely sterile; it can be boiled in water any length of time without injury; its texture is practically impervious to the entrance of germs; and it does not in itself furnish a culture medium for the growth of pyogenic bacteria.

Silkworm gut can be removed after any method of longitudinal suture in which the perforations in the fascia practically assume a straight line when traction is made on the suture.

If a form of suture is used which surrounds tissue, as the glover's or over-and-over stitch, it will bind, and be difficult or impossible to remove it.

Model " A" shows the method of application of a fastened longitudinal herring-bone suture of the linea alba, which produces edge-to-edge approximation of the cut fascia.

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[1] Read before the Chicago Surgical Society, April 4, 1904.

Model " B" shows the method of application of a fastened basting suture, which produces a flap approximation of tissue, applicable to the Bassini operation for inguinal hernia or to the Mayo operation for umbilical hernia.

The aim of every surgeon is to close his laparotomy wound in such a manner that he will get (1) Sterile healing of the wound, (2) close and accurate union of the strong fascia, (3) no postoperative ventral hernias.

The ultimate object is to obtain a scar so well placed and so strong as to prevent postoperative ventral hernia as long as the patient may live.

It is along these lines that methods should be compared.

1. *Sterility.*—Abel's analysis of the cases occurring in the Leipzig Gynæcological Clinic for four years shows 280 cases of catgut fascia suture with fifty-two infections, or 18 per cent. of infections.[2]

The writer has used the tied longitudinal silkworm-gut suture in all clean laparotomies during the three years 1901–3.

The results are as follows: One hundred and seventy-eight cases with seven infections, or less than 4 per cent. of infections.

Of these cases, twenty-three were emergencies, operated upon without previous preparation, with four cases showing infection, all limited to the subcutaneous fat.

The remaining 155 cases had hospital preparation previous to the operation, with three cases of infection, or less than 2 per cent. of suppuration in the prepared cases.

The reports by Haggard,[3] Bell,[4] Hamilton,[5] and others sustain the position that the use of a removable buried silkworm-gut suture lessens the danger of abdominal wound suppuration.

2. *Approximation of Fascia.*—After the process of cicatrization has been completed, a close union of the fascia by a minimum amount of scar tissue, with no interposition of peritoneum muscle or fat, is the ideal prophylactic against postoperation ventral hernia. In one of my cases a secondary laparotomy was required. The fascial stitch was allowed to

FIG. 1.—Cross-section of scar three weeks after operation; magnified four diameters. 1. Skin incision. 2. Peritoneal incision; scar line between 1 and 2. 3. Skin and subcutaneous fat. 4. Fascia over rectus muscle. 5. Rectus muscle.

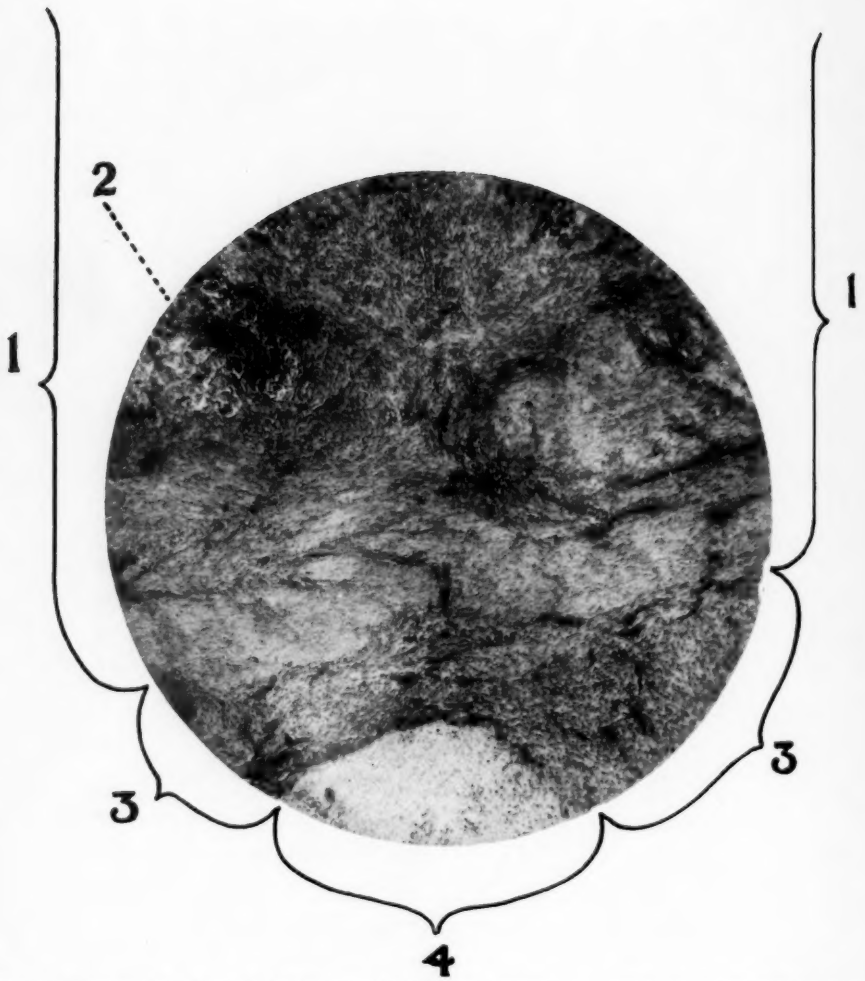

FIG. 2.—Cross-section of scar in fascia, magnified seventy diameters. 1. Fascia. 2. Location of silkworm gut. 3. Inflammatory material. 4. Muscle.

remain three weeks, when the entire scar containing the stitch was dissected out. Cross-sections of the scar for microscopical examination were made by Professor W. A. Evans and microphotographs by Dr. Gramm.

The laparotomy wound was made through the right rectus muscle and the tied suture was in the fascia covering the muscle.

Microphotographs (Figs. 1 and 2) show for themselves the closeness of the union of the fascia and the small amount of inflammatory tissue present.

3. *Postoperative Ventral Hernia.*—Freedom from postoperative ventral hernia is the final test of all methods of abdominal suture. Probably the most accurate comparative statistics that we have on the subject are those compiled by Abel.[2]

Abel concludes that hernia is not due to conditions of the abdominal wall, but depends on the closeness of union of the fascia and the manner of healing of the wound. According to Abel's tables, fewer hernias followed fascial suture by catgut than by any other method of abdominal wound closure in use at that clinic. He gives 224 clean cases followed by twenty hernias, or 8.9 per cent., and fifty-two infected cases followed by sixteen hernias, or 31 per cent. A total of 276 cases of fascial catgut suture followed by thirty-six hernias, or 13 per cent. The best showing was made by cumol catgut with fifty cases followed by three hernias, or 6 per cent. Of the writer's 178 cases of removable silkworm-gut suture, 131 have been followed up to the time of the preparation of this report. One case of spontaneous epigastric hernia operated upon by Mayo's method had a recurrence of hernia two inches from the old line of incision five months after operation.

Three-fourths of 1 per cent. of postoperative ventral hernias.

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A POSTERIOR INCISION IN CERTAIN APPENDICITIS OPERATIONS.

BY JOHN G. SHELDON, M.D.,

OF TELLURIDE, COLORADO.

THE operation that I shall describe is one in which the appendix is reached through Petit's triangle. A vertical incision is made along the outer border of the latissimus dorsi and extends from the crest of the ilium upward. This exposes the outer border of the quadratus lumborum and the lumbar fascia and aponeurosis of the transversalis, which extend anteriorly from the outer border of the muscle. The second incision is made transversely, close to the iliac crest, through the lumbar fascia and transversalis, exposing the parietal peritoneum directly over the ascending colon and cæcum.

A glance at the anatomy and pathology of the appendix will show that the foregoing method of operative procedure may be especially advantageous in treating an inflamed appendix or its most frequent complication, a localized abscess. The appendix, cæcum, and ascending colon lie on the posterior parietal peritoneum. The outer border of the quadratus lumborum muscle overlaps the inner one-half of the ascending colon, while the outer portion of this viscus projects beyond the border of the muscle into the triangle of Petit. The appendix, in the majority of cases, is found behind the cæcum, with its tip pointing upward. When the patient is lying in a straight position, the appendix is below the line of incision; but I have found that when the patient is placed in the lateroprone position, with a large pad under the loin, the cæcum protrudes into the angle between the crest of the ilium and the outer border of the quadratus lumborum muscle.

In cases with pus formation, the abscess is found directly in contact with the cæcum (Bloodgood [1] reports a case, contrary to this statement, which will be discussed later), and can

be opened more quickly, more easily, and with less danger, through a posterior incision than by any other route. Posterior drainage, as herewith advised, opens the abscess in the most dependent part, and thoroughly drains retroperitoneal infection. In chronic cases, with many and firm adhesions, I have found the operation, through the posterior incision, easier and more rapid than when the incision is made as is ordinarily advised. In this connection, I refer to operations for removal of the appendix. Of course, if operation is required for intestinal obstruction, following adhesions, the posterior incision would in most cases be inadequate and should not be advised.

Description of the Operation.—Position of the patient. The patient is placed on the left side and a large support put under the left loin. This brings the right loin into a favorable position for operation, and lengthens the distance between the right costal arch and the iliac crest. It also brings the appendix nearer the incision by depressing the right side of the pelvis.

The incision. An incision is made from a point one-half an inch behind the highest point of the crest of the ilium towards the tip of the twelfth rib. The length of the incision depends on the obesity and the body form of the patient. The anterior border of the latissimus dorsi muscle is located, freed by blunt dissection, and retracted posteriorly. This exposes the outer border of the quadratus lumborum muscle, the lumbar fascia, and the aponeurosis of the transversalis. A transverse incision, one-half to one inch above the crest of the ilium, is then made. This incision begins at the outer border of the quadratus lumborum and extends forward, parallel to the fibres of the transversalis, as far as is necessary to secure sufficient room to operate quickly. I usually separate the fibres of the transversalis by blunt dissection. The subperitoneal fat, which, in some cases, is quite abundant, is pushed aside with the finger covered with a piece of gauze. The peritoneum is opened near the forward part of the incision and the peritoneal incision enlarged in a posterior direction. On opening the peritoneum, the cæcum presents itself in the wound. The remainder of the operation does not require description. In cases where

drainage is not necessary, the wound is sutured, in layers, with catgut and silkworm gut.

The vessels and nerves, in relation to the field of operation, are as follows:

The iliac branch of the iliohypogastric nerve pierces the external oblique and is anterior to the line of incision. The main trunk of the iliohypogastric lies above the incision in the transversalis in most cases. Its course is parallel to the fibres of the transversalis; and, if the fibres of the transversalis are separated by blunt dissection, the nerve is not injured. The ilioinguinal follows the same direction as does the iliohypogastric, and is avoided in the same manner. The anterior branch of the last dorsal nerve is, at the site of the operation, internal to the transversalis and is a considerable distance above the transverse incision. The lateral cutaneous branch of the last dorsal nerve is given off anteriorly to the posterior border of the external oblique, and is not in the operative field.

There are no arteries or veins of sufficient size or importance close to the incision. I have never found it necessary to ligate a vessel in doing this operation; and seldom has it been necessary to use hæmostats to check temporary bleeding.

Advantages of the Method.—In clean cases, the operation has few advantages over the method ordinarily employed. In obese cases the posterior operation is more rapid, and is less likely to be followed by hernia. In all cases, I have found the operation, as herewith described, followed by less shock and abdominal distress than a laparotomy through an anterior incision.

In cases with abscess formation, and in all cases requiring drainage, I have found operation through the posterior incision preferable to the old method. The abscess is opened in the most dependent part, and the infected area is reached and treated without coming in contact with the omentum or small intestines. Retroperitoneal infection, which is quite a common and, according to Stone,[1] serious complication, is drained much more efficiently than is possible through an anterior incision. It has been my experience that infected cases, when drained by the

posterior operation, heal very rapidly as compared with similar cases drained anteriorly. When a posterior incision is used, patients can be permitted to leave the bed at an earlier date, and with less liability to postoperative hernia, than if they had been operated through an anterior incision. It is seldom that herniæ follow operations for appendicitis through an anterior incision, but they do occur. I have had one case, a pus case drained anteriorly. Taylor [2] and Rodman [3] each report a case of hernia following clean operations.

Disadvantages of the Method.—I have operated on fifty-eight cases by this method and have found no disadvantages. During my first cases, I was fearful that I should experience great difficulty in operating on patients in whom the cæcum and appendix were fixed by a short mesentery. I have operated two such cases by the posterior method, and found the operation less difficult than are operations on similar cases through an anterior incision.

J. C. Bloodgood [4] reports a suppurative case that would not be suitable for the posterior incision. In this patient the abscess was between the folds of the mesentery of the small intestines. These cases, doubtless, are very rare, and are exceptions to the rule.

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INFLAMED APPENDIX IN THE SAC OF A FEMORAL HERNIA.[1]

BY AURELIUS RIVES SHANDS, M.D.,

OF WASHINGTON, D. C.

MRS. O., a widow, aged twenty-nine years, mother of one child, now seven years old, a very robust woman, who has always enjoyed exceptionally good health, first noticed a swelling in her right groin four years ago; it had developed very gradually, and, as it had given her little or no pain or inconvenience and had always disappeared when in a recumbent position, she gave it little or no thought until the latter part of October, 1903, when she noticed it was increasing very rapidly in size and was very painful to the touch, and did not disappear when in a recumbent position as formerly.

She consulted Dr. L. S. Savage on October 31, 1903. At that time he found the condition above described, and that she had a temperature of 101° F. I saw her in consultation with Dr. Savage the next day, and diagnosed the case as one of incarcerated femoral hernia, and advised an early operation, not urging an immediate operation, as there were no symptoms of strangulation. The hernia was about the size of a duck's egg, and was in somewhat the shape of an hour-glass; this was due to a constricting band around the mass. The hernia was very tense and extremely painful on the slightest manipulation, and apparently irreducible by manipulation. Her temperature was 100° F. at that time.

She was admitted to Sibley Hospital on November 2, and was operated on the morning of the 3d.

Through the usual incision for operating for femoral hernia, the hernial protuberance was easily enucleated from the surrounding structures *en masse,* exposing the neck of the sac at the point of its exit from the femoral ring. Upon opening the hernial sac there was a gush of peritoneal fluid, which was confined under considerable pressure. There was neither intestine nor omentum

[1] Read before the Medical Society of the District of Columbia, December 8, 1903.

in the sac, but firmly adherent on the side was the appendix cæci with the distal end ulcerated and much enlarged. Upon examination, it was readily seen that the internal membrane presented a condition of acute peritonitis extending to the lumen of the neck of the sac, whose walls were closely adherent, the result of the inflammatory condition, thus confining the peritoneal fluid to the hernial sac and protecting the general peritoneal cavity from the peritonitis.

After separating the appendix from its adhesions, it was amputated in the usual way, and the wound was closed as for a radical cure for femoral hernia. Primary union resulted; the patient made an excellent recovery, and left the hospital at the end of two weeks.

It would seem that nothing new could be added to the subject of appendicitis; nevertheless, this case does offer something entirely new, in that the appendix was accidentally found presenting all of the characteristic clinical features of an acute appendicitis outside of the abdominal cavity.

After exhausting, with a negative result, every resource at my command to ascertain if ever such a case had been recorded, I wrote to Dr. W. B. Coley, of New York, who has probably operated on more cases of hernia than any surgeon in this country, to know if he had ever encountered such a case. The following is from his reply:

"I have never personally found the appendix in a sac of a femoral hernia, although I have seen it a good many times in inguinal hernia, once on the left side. I also saw Dr. Carl Beck operate on a case of irreducible femoral hernia some years ago, in which the appendix was found in the sac, though there were no symptoms of strangulation or incarceration in this case.

"I think your case must be very *nearly unique*. I have recently operated upon a similar case, an inguinal hernia in the female, in which the appendix was incarcerated and much inflamed."

A RADICAL OPERATION FOR MALIGNANT NEOPLASM OF THE URINARY BLADDER.

BY ALBERT ASHTON BERG, M.D.,

OF NEW YORK,

Adjunct Surgeon to Mount Sinai Hospital.

RADICAL operation for malignant disease means a complete removal of the primary carcinoma, together with all the infected lymphatics and glands. The prognosis for lasting cure depends entirely upon the thoroughness with which the excision is done. In all the operations that are performed for malignant neoplasm of the urinary bladder, no attention is given to the thorough removal of the internal iliac lymphatics and glands. These procedures can consequently not be considered as radical, nor as holding out any hope for permanent cure of the disease.

The writer begs to propose the following operation as being a radical one for removing malignant growths of the bladder, together with the glands and lymphatics; it is especially applicable to new growths involving the posterior wall and bas-fond of this viscus.

The ureters are both catheterized before the anæsthesia is commenced.

The abdomen and genitals are thoroughly shaved and cleansed the day before the operation.

Under full anæsthesia, a three-inch incision is made in the median line of the abdomen, from just above the symphysis pubis upward. The patient is at once put into the Trendelenburg position, and the small intestines carefully packed away and the general peritoneal cavity protected by large, warm, moist compresses. Over these compresses a second layer of dried gauze pads is placed. The small pelvis is thus freely exposed.

The peritoneum of the pelvic floor is now divided straight across,—in the female at its reflection from the posterior vesical surface on to the cervix uteri, and in the male at the anterior aspect of Douglas's cul-de-sac. The peritoneum is then bluntly raised up from the pelvic floor to the level of the bifurcation of the common iliac artery, where the ureter, with its contained catheter, is easily identified lying adherent to the peritoneum. The ureter can be at once traced downward to the bladder, and its position carefully noted. The glands and lymphatics along the internal iliac artery, together with the surrounding loose cellular tissue, are dissected out on either side down to the bladder-wall. This step in the operation may be attended with considerable venous hæmorrhage, especially near the bladder. The hæmorrhage is easily controlled by packing; if the dissection has been bluntly carried out, the bleeding will never be very copious. The important structures that are encountered are the ureters, previously identified, the internal iliac artery and vein, which are easily recognized and avoided, the uterine artery in the female, crossing the ureter at upper level of the cervix; the seminal vesicals and vas in the male.

The prostatic plexus of veins in the male lie below and behind the field of operation, and should not be encountered unless the prostate is involved in the malignant disease.

Should the ureter be involved in the cancerous growth, it should be dissected out along with the glands and lymphatics, and preparations made for its resection and subsequent implantation into the bladder. It is to be especially noted in dissection of the ureter that it is not to be too closely stripped from its cellular bed; for its blood supply is derived from this cellular tissue, and, if it is stripped too closely, it may necrose.

The infiltrated glands and lymphatics being removed, the cellular space of the pelvic floor is loosely tamponed with gauze. This checks oozing and prevents infection. The peritoneal packings are carefully inspected and arranged to prevent soiling of the peritoneum.

The bladder is now opened in healthy tissue, just above the upper limit of the neoplasm. The cavity of the bladder

is at once dried out with *sponges,* and the surface of the neoplasm thoroughly cauterized with pure carbolic acid or the actual cautery.

The neoplasm is now widely excised; if the lower end of the ureter is diseased, it should be removed. Hæmorrhage of the bladder-wall is easily controlled by pressure forceps or ligature.

If the ureter has been partly excised, its proximal end should be now implanted into the summit of the bladder, either intraperitoneally or extraperitoneally. It is best not to implant the ureter into the line of the excised area, for the union at the meeting-point of the suture lines is apt to be imperfect, and leakages occur.

The defect of the bladder-wall is now repaired by two rows of sutures,—catgut for the mucosa, and silk, passed Cushing mattress fashion, for the muscularis.

Drainage of the entire pelvic floor by gauze. In the female the gauze is conducted out through the vagina, in the male through a counterperineal incision, between the rectum and the prostate.

The pelvic peritoneum is completely closed over the gauze drainage. Closure of the abdominal wound without drainage.

The advantages of this operation may be summed up as follows:

It affords the freest access of any to carcinoma of the posterior wall and base of the bladder.

It is the only method by which the indurated lymphatics and glands along the internal iliac artery can be removed.

It permits us to remove the ureter when diseased, and to at once reimplant it into the bladder or into the opposite ureter.

It allows of accurate suture of the defect created in the bladder-wall.

It permits of excellent drainage below.

The objections that may be raised to it are that we expose the patient to graver risks of infection than by the extraperitoneal method of resection. This cannot be denied; but, as it is impossible to remove the glands and lymphatics by the extra-

peritoneal method, we must either give up all attempts at radical cure of vesical carcinomata or resort to the intraperitoneal method as outlined above.

The danger of infection can be reduced to a minimum. The bladder is not opened until the glands and lymphatics and cancerous tissue in the pelvic floor have been dissected free; the cellular tissue is then covered by iodoform gauze. As soon as the bladder is opened, it is sponged dry and the surface of the neoplasm at once thoroughly seared with the actual cautery or pure carbolic acid.

Very little blood is lost during the operation. As there is no exposure nor handling of the intestines, there is no shock, even though the operation is a lengthy one. In the author's two cases, the patients suffered no shock, although the operation lasted three hours and two and one-half hours respectively.

The writer recognizes that the dissection in the pelvic floor is not an easy one. But if at the very beginning of the operation the pelvic peritoneum is bluntly peeled up to the level of the common iliac bifurcation, and the ureter there identified and traced downward, the dissection is much simpler and can be more quickly done. The introduction of the ureteral catheters simplifies the identification of the ureters.

The writer feels that the possibility of effecting a lasting cure justified the proposal of this operation. Either we must remove the glands and lymphatics together with the neoplasm, or else give up the hope of curing our patients.

In the past year the writer has had occasion to practise this operation in two patients.

In the first patient, a woman of thirty-two, the carcinoma of the bladder complicated an advanced carcinoma of the uterus, vagina, and both broad ligaments. Only the young age of the woman prompted the writer to attempt radical cure. Hysterectomy and complete excision of the internal iliac lymphatics and glands were first done. Then the left side of bas-fond, left posterior surface, and left ureteral orifice of the bladder were removed. Immediate implantation of the left ureter into the summit of the bladder, without tension. The bladder defect was

closed by two rows of sutures. Drainage of entire pelvic floor through vagina; complete closure of pelvic peritoneum and of abdomen. Uninterrupted convalescence; eight months later recurrence in the pelvis. The patient had gained twenty-five pounds; she lost five pounds in the last two months

The second patient was likewise a woman. Extensive carcinoma of right posterior wall and right side of base and right ureteral orifice, complicated by bleeding uterine fibroids. Preliminary hysterectomy; removal of internal iliac glands and lymphatics was easily accomplished. When bladder was opened, the carcinoma was found to extend into the urethra. Wide excision would have necessitated removal of posterior one-third of urethra, with consequent incontinence. The exposure was excellent. Excision would have been very easy. In view of the extensive involvement of the disease, with the possibility of establishing incontinence of urine if excision was done, the writer was led to abandon his original purpose of doing a radical excision. The entire carcinoma mass was therefore destroyed with the actual cautery. Permanent catheter in bladder. Closure of opening into the bladder by a double row of sutures. Drainage per vaginam. Closure of pelvic peritoneum and abdominal wound without drainage. Uninterrupted convalescence.

The writer was at this second operation impressed with the excellent exposure, and the easy access afforded to the glands, lymphatics, and posterior wall and base of the bladder.

REPAIR OF THE URETHRA BY TRANSPLANTATION OF THE URETHRA OF ANIMALS.

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THE object of this paper is to describe some cases, three in number, in which patients with defects of the urethra have been treated by grafting into their tissues portions of the urethra of the ox.

Two of the patients so treated were men who had sustained a complete and extensive rupture of the urethra in the perineum; while the third was a boy with hypospadias, in whom there was a deficiency of the floor of the urethra for the whole of the penile portion of the channel.

It is not my purpose to enter fully and in detail into the various methods of treatment that have been proposed or adopted by different surgeons to effect a cure in similar cases; but it will be necessary to refer to some of these, and to say a few words regarding the condition of the parts which renders such methods of treatment necessary.

Complete transverse rupture of the urethra is an injury that, *per se,* may be associated with many complications of such grave importance as to elevate it to the rank of an accident of the first magnitude. These complications may be primary; in which case they are mainly dependent on the state of the urine at the time of the injury and its extravasation into the tissues around the rupture, or they are secondary, and in that case are associated with the healing process. For it may be laid down as an axiom that, unless the rupture is repaired by the union of urethral epithelium, a "splice" between the two portions of the canal by the formation of cicatricial tissue is unavoidable, so that the ultimate result to the patient is a stricture of the most intractable nature associated with all the ill effects of

backward pressure throughout the entire urinary tract posterior to it.

The question, therefore, as to the treatment required for this condition is one of great importance and of much practical interest.

In recent cases, provided that a large extent of the urethra is not actually destroyed by the contusing violence, the treatment is easy, and consists of exposing the ends of the two portions of the urethra and bringing them into accurate apposition by suture. Even in cases where a certain extent of the urethra is destroyed, the tissues which enter into the formation of the channel are so elastic as to permit of them being stretched over a considerable gap if they are sufficiently freed by dissection.

But there is difficulty in connection with these cases where the trauma has involved a considerable extent (length) of the urethral walls, or where sepsis has been followed by suppuration round the divided urethra; for by either of these processes necrosis of tissue is brought about and the suture of the two ends of the urethra rendered impossible or futile. Attempts to remedy the condition in such cases may be carried out on the following lines:

1. Guyon (*Gazette Hebdom.*, No. 20, 1892) advocates treatment of these cases by allowing the urethral tissues to regenerate from the two ends. He does not make any attempt to bring the ends together; they are merely freed from their surroundings; a soft catheter is passed into the bladder, and over this the tissues of the perineum are sutured: the catheter is allowed to remain in from two to four days, and after that time the patient is allowed to pass urine in the natural manner. It is claimed that from the ends of the urethra a regeneration of the mucous membrane will take place, and eventually line the channel formed between them by the suturing of the soft parts over the catheter.

Indeed, Ingianni (*Gaz. dell. Ospedale et della Clin.*, 1898, No. 127) (to whose original paper I have not access, though a brief quotation of it and the conclusions arrived at are given in

Centralb. für Chirurgie, No. 6, 1899) claims, from a series of experiments carried out on dogs,—

(1) That a longer or shorter urethra can be produced.

(2) That both mucous membrane and cavernous tissue are reproduced, but not muscular tissue.

(3) That the reproduction takes place by the growth of a granulation tissue around the catheter from the ends of the urethra.

(4) It takes place faster where there is little postoperative inflammatory state.

(5) After fifteen to thirty days the new canal shrinks a little, but is only exceptionally obliterated.

Guyon in the above-mentioned paper briefly records three cases of traumatic stricture treated in this manner, but does not state what extent of the urethra was excised in any one of them. He makes the rather surprising statement that contact of urine, whether normal or pathological, does not harm the process of cicatrization. One would have thought that septic urine passing over a wound recently made and sutured would be liable to infect it.

2. By grafting the wound with skin or mucous membrane, the grafts being cut by Thiersch's method; or, by transplanting flaps of the same tissues.

Gersuny employed the latter method (transplantation) with apparently a good result (Report by Mrha, *Wien. klin. Wochenschrift,* 1898).

Wölfer (*Arch. klin. Chirurgie,* 1888) grafted a wound with the mucous membrane obtained from the vagina in a case of prolapse of the uterus, and the inner layer of the prepuce has been used by several surgeons for the same purpose (Meusel, Weir).

I believe that actually all these methods have been employed only in the treatment of cases of old standing and where a stricture of the canal was present. I am not aware of any case having been published where either line of treatment was made use of at a time when the case could be said to be "recent," *i.e.,* before the urethra had been "spliced" by the

formation of an isthmus of cicatricial tissue between the two portions.

I have myself, however, treated with success a case of this kind by employing a skin flap; but skin does not appear to me to be a satisfactory material to employ for the purpose of making a channel to conduct urine. Skin is very easily irritated and inflamed by the constant bathing with urine. One has only to consider the effects on the skin of the scrotum and perineum in cases of incontinence of urine to be reminded of this fact.

Still, in some cases it may be the only tissue that one can employ, as in my case above referred to. Mucous membrane is probably a much better material for this purpose than skin, but is not always available at the time one requires it. In any case the employment of either of these substances entails at least two operations,—one for the purpose of making the graft, and a second for the conversion of the graft, after it has become adherent in its new situation, into a canal. It appeared to me, therefore, that, provided the grafts would live, it might be possible to treat these cases by implanting a portion of the urethra obtained from some animal; the advantage of this procedure being that not only was a complete channel obtained that could be buried in the tissues at one operation, but a channel lined with a mucous membrane prepared for conducting urine over its surface.

I have adopted this procedure on five occasions now in the cases of three patients, choosing for the purpose the urethra of a bullock, for, although the urine of the herbivora is alkaline, it was thought this factor might be neglected, as the difficulty of obtaining a urethra of a satisfactory diameter from an animal secreting acid urine is very considerable.

The following are the notes of the cases:

CASE I.—J. C., aged fifty-one years, but looks at least ten years older, was admitted to my ward in the Glasgow Royal Infirmary about midnight, December 2, 1900, on account of retention of urine.

He has been a heavy drinker, and was intoxicated at the onset of the retention two days before admission, since then only very small quantities of urine have been passed. A medical man had seen him on two occasions, and each time tried to pass soft instruments into the bladder, but failed to do so. On the day of admission the penis began to swell and no urine had been passed. On admission he was very exhausted, the penis was slightly swollen, the prepuce œdematous; at the penoscrotal junction the tissues had a slightly bruised appearance, the prostate was not abnormally large, the bladder reached to the umbilicus.

An instrument could not be passed into the bladder; at a point two inches from the meatus an obstruction was encountered which was impassable, so the bladder was aspirated and a large quantity of blood-stained urine drawn off. The following morning, on palpating the parts, I found a crackling sensation in the tissues at the penoscrotal junction, so made a free incision there, but the tissues only appeared to be bruised. Another incision was made in the perineum and a cavity opened into, which contained foul-smelling blood and urine, and the condition of the tissues was suggestive of traumatic rupture of the urethra. I could not find the proximal end of the urethra, so made a suprapubic cystostomy, washed out the bladder, which contained ammoniacal urine and blood, and passing a bougie from the bladder into the urethra found the latter to be destroyed from the apex of the prostate forward to the level of the triangular ligament, at least. I was still unable to pass an instrument through the penile urethra, but, hoping that the incision made there would relieve tension, I did not persist in the attempt. The wounds were dressed with moist dressings and the bladder drained by Cathcart's siphon apparatus. The discharge continued very offensive, and it was soon obvious that a large amount of tissue had sloughed, so the scrotum was split in the middle line, and it was found that the corpus spongiosum was completely gangrenous from the triangular ligament to a point five centimetres from the meatus of the urethra; this was all cut away, and a very large wound was left with a correspondingly large gap in the urethra; only the prostatic portion and a piece five centimetres long at the other end remaining.

The patient improved rapidly after this, and I decided to attempt to supply the defect in the urethra by a graft. This was done January 14, 1901. A portion of the penis of a young bullock

just killed was obtained at the slaughter-house and conveyed to the Royal Infirmary in hot sterile saline solution; the urethra was dissected out, leaving only a few alveoli of spongy tissue attached to it.

The patient's wound was then prepared, the ends of the urethra freed sufficiently to enable them to be sutured to the graft, and a portion of the bullock's urethra thirteen centimetres in length stitched in position. The wound was closed by buried and superficial stitches. It all healed absolutely by primary union except at the junction of the graft with the remaining portion of the penile urethra, there these two failed to unite, and a fistula resulted.

February 2, 1901, nineteen days after the implantation, I passed a No. 6 English bougie through the implanted urethra into the bladder easily, then freshened and sutured the ends of the urethra at the fistula again. Several times after this operation (although it was not intended that he should do so) urine was passed along the whole length of the urethra; but eventually the sutured part broke down again, and this was followed by some narrowing of the "graft" at the penoscrotal junction, so on March 26, 1901, I split the scrotum again, dissected out the most distal part of the graft, and implanted (a second time) 7.5 centimetres of a bullock's urethra obtained as on the former occasion: it all remained viable, and the wound healed perfectly, but the junction of the new graft with the (original) penile urethra again failed, and, although it was operated upon several times and always held for a time, it always gave way eventually.

He was finally dismissed July 23, 1901, passing all the urine by the fistula, but able to do so in the erect attitude. Since then he has been seen from time to time; he can retain urine from one and a half to two hours, and has complete control of the bladder. He passes urine through the whole length of the implanted urethra.

During 1903 he has had several attacks of retention of urine, due, I think, to the state of his bladder rather than to that of the urethra, for we can always get a catheter into the bladder with ease.

A second case was treated in a similar manner last year.

CASE II.—L. S., aged twenty-eight years, admitted to the Glasgow Royal Infirmary, August 1, 1903, late at night. At about

9 A.M. that day he fell on the footplate of a locomotive, striking his perineum; he bled freely from the meatus, and shortly after the injury attempted to pass urine; none came by the meatus, but he was seized with intense pain and fainted. A medical man saw him shortly afterwards, and attempted to pass an instrument into the bladder, but failed.

On admission the patient was a good deal collapsed; blood was oozing slowly from the meatus; there was no sign of bruising or even of fulness in the perineum, but he complained of intense pain there on the slightest pressure. His bladder was distended to about half-way to the umbilicus.

Under anæsthesia I attempted to pass a full-sized instrument into the bladder, but could not get it beyond a point corresponding to the perineoscrotal junction, so I incised the perineum and opened into a large cavity full of blood-clot; the greater portion of the membranous part of the urethra appeared to have been destroyed, and I could not find the proximal end of the urethra, so was obliged to open the bladder above the pubis. A bougie was passed from the bladder, and it was found that the urethra terminated about half an inch in front of the apex of the prostate.

The wound was dressed wet in case it had been infected with the urine, and the bladder drained by a Cathcart siphon.

August 3, 1903. His temperature has been 101° F. or thereabouts all the time, but the perineal wound looked very well; and to-day I freed the distal portion of the urethra and just managed to suture it to the end of proximal portion and closed the wound; but his temperature kept up and the wound broke down; the bladder showed signs of infection even before the wound did (the patient stated that to his knowledge he had no urinary symptoms before his accident, but his bladder condition had made me suspicious from the beginning).

By the end of August, after constant dressing, the perineal wound was clean, but there was a gap of fully five centimetres between the ends of the urethra, and I determined to try and supply the defect by implanting a portion of animal urethra. On September 3, five centimetres fully of the urethra of a young bullock obtained immediately after the animal had been killed were implanted, its ends being sutured to the extremities of the urethra and the wound closed.

The wound healed perfectly, except one minute point just

behind the scrotum; but on September 14, 1903, a No. 7 English bougie was passed easily from the meatus to the bladder. The bladder condition had improved very greatly by this time.

September 21, 1903. He had a sudden desire to pass urine, although the siphon is still in use and some ounces of urine were passed per urethram. No. 7 has been passed every second day easily.

September 23, 1903. His temperature, which has been normal for the last three weeks, rose to-day to 102.4° F. and he vomited, and complained of pain in the region of the right kidney, but on palpation there was no swelling to be felt, though the region is tender. He got rapidly worse, and a swelling having developed in the region of the right renal, my friend Mr. Luke, to whom, for his invaluable assistance at these, and all my operations, I am continuously indebted, in my absence performed a nephrotomy and evacuated a good deal of pus from the kidney, but the patient did not improve; he gradually became comatose and died September 29, 1903.

At the post-mortem examination it was found there were numerous small abscesses in the cortex of the right kidney, mostly arranged in groups. The pelvis of the kidney contained several small calculi, and the right ureter was blocked by a calculus just above the level of the pelvic brim. The left kidney and ureter were healthy.

CASE III.—*Penile Hypospadias treated by Grafting a Portion of a Bullock's Urethra.*

A boy, aged fourteen years, was admitted to the Glasgow Royal Infirmary, January 13, 1902. The penis is greatly curved downward, the urethra terminates just anterior to the penoscrotal junction, and all the urine issues here. He is obliged to sit down to pass urine, owing to the curved condition of the penis; the line of the penile urethra is occupied by many little tags of skin. There is no frenum and no meatus in the glans.

January 30. After making a perineal fistula, the tags of skin were all cut away and the incision extended well into the substance of the erectile tissue, the fibrous sheath of which along with the skin was dissected back at each side as a flap The penis could now be quite straightened. Seven centimetres of a bullock's urethra treated as in the other cases were then sutured into the groove made in the penis and to the freshened end of the urethra

posteriorly,—in front it was sutured to the margin of the incision in the glans and the wound closed over it.

It all healed except at the junction of the original urethra and the graft.

March 2, 1903. I passed a No. 3 English bougie the whole length of the urethra into the bladder and also closed the fistula, but this failed, and so did a second attempt. The patient about this time had several epileptic fits, which we found he had suffered from before admission.

His friends now removed him from hospital, and would not permit further treatment, but up to the time he left I could pass a No. 4 bougie from the meatus into the bladder.

He was not seen again until September 18, 1903, when he came back anxious for further treatment. Most of the urine was passing by the perineal fistula, but some also came by the opening in front of the scrotum. A small part of the implanted urethra was seen to be still present and admitted a small bougie, but the meatus was closed.

September 5, 1903. I dissected out the cicatrix of my former operation, cutting well into the erectile tissue, and found that practically the whole of the former graft was not only intact, but permeable. I excised the whole of it, and then implanted fully nine centimetres of a recently killed bullock's urethra, suturing it to the end of the urethra posteriorly and the margin of the glans in front, and closed the wound completely. The graft lived, and the wound healed perfectly except at the junction of the graft with the original urethra at the penoscrotal angle. He had many fits after the operation, which made it a still more difficult matter to keep the penis steady. At the beginning of December I closed the defect at the penoscrotal angle and was able to pass a No. 8 English bougie all the way to the bladder. This operation was successful, and he went out December 29, 1903, after having been taught to pass a bougie himself.

He has been seen frequently since. A No. 6 can be passed easily.

The treatment of these three patients represents five operations in which portions of an animal's urethra, varying in length from five to thirteen centimetres, have been implanted with success, that is to say, the grafted tissue lived and remained

a patent channel. It is true that in two of the patients the procedure required to be done a second time, but in each of them, at the time of the second operation, the tissue which had been grafted on the former occasion was found to be present.

The Figure appended—a microphotograph (for which I am indebted to my friend, Dr. T. H. Bryce) of a section of the graft excised from R. M. after being in the tissues of the penis for nineteen months—shows a perfect canal lined by a normal layer of epithelium.

It was the penile region which gave the trouble in the two patients (J. C. and R. M.), and this was due to the extreme difficulty there is in adequately maintaining this part in a state of rest. Further, in the case of R. M., we had the recurring epileptic seizures as an additional source of disturbance of the parts.

But where the graft was placed in the perineal region the result was excellent. In the specimen obtained at the post-mortem examination of L. S., it is hardly possible to make out the line of union of the mucous membrane of the graft with that of the original urethra, the channel is so smooth.

So far as I am aware, the procedure constitutes a new method of treating hypospadias; in fact, it was in connection with a case of this kind which I saw nine years ago that the idea of attempting a graft in this way occurred to me, but the patient—an adult—declined any operative proceeding, and I had no opportunity of carrying it out until J. C. came under my care in December, 1900.

Every method of treating hypospadias by operation is uncertain as to the result; for, as in all plastic operations, there is the liability of flaps to slough or of sutures to give way before union has completely taken place; a fistula frequently results somewhere along the course of the new canal. One reads continually in the reports of such cases that before a cure has been effected several operations have been necessary.

This method of implanting a true urethral tube is at least as certain as any other that has been suggested, while the advantage of having a canal ready made, which can be obtained in

Transverse section of the urethral canal excised from Case III nineteen months after implantation.

unlimited quantity and which has been developed for the actual purpose of transmitting urine, is a very great one. And for the same reason it is, I believe, greatly superior to the methods hitherto employed in the treatment of those deficiencies of the urethra which result from traumatic rupture.

A case was recorded in the *Lancet*, Vol. i, 1896, by Clennell Fenwick, in which a portion of a sheep's urethra (the length is not stated) was transplanted in a case of intractable stricture, but I cannot find any other.

THE FORMATION OF AN ARTIFICIAL VAGINA BY INTESTINAL TRANSPLANTATION.

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Of the propriety of establishing a vagina, in cases in which this canal is absent either as a congenital defect or an acquired deformity, there seems to be no question, even when the canal is thus established purely for coitional purposes.

The early operations for this object consisted in making an opening in the cellular tissue between the bladder and the rectum, and attempting to maintain it by the wearing of some form of tampon or plug. These attempts, for reasons which are well understood, uniformly failed.

The more common method of operating consists in taking strips of mucocutaneous and cutaneous tissue from the vulva and internal aspects of the thighs, introducing these strips into a channel previously made between the rectum and bladder, and maintaining them in position by gauze packing until they unite to the cellular tissue, and thus make the opening permanent. Several quite ingenious devices have been resorted to for the purpose of maintaining this apposition.

An important modification of this method was proposed and carried out by Beck, of New York, some five years ago. (Annals of Surgery, October, 1900.) He first made a transverse incision immediately above the symphysis pubis, as though about to make a transverse suprapubic cystotomy. This incision was carried carefully downward between the peritoneum and bladder, hugging the bladder closely, until he reached the space between the bladder and rectum. He then made a counter-opening in the usual way from the perineum to meet the passage which he had already established. In this way he made a canal extending from the perineum to above the pubes,

but without opening the peritoneal cavity. Two skin flaps were then dissected from the thighs, their bases being represented by the labia, and their length being sufficient to extend through the entire length of the newly formed canal. These flaps were then seized with forceps introduced from above, drawn through the canal and fastened by stitches at the upper end, and the suprapubic wound closed. Iodoform gauze was then introduced from below so as to press the flaps laterally against the sides of the passage.

Other operators, acting on the suggestion of Mackenrodt, have endeavored to cover the surface of the new vagina by mucous membrane taken from another patient operated upon at the same clinic, while in a case recently reported the surgeon was able to line the new canal with the inverted mucous membrane of an enormously hypertrophied clitoris which he amputated at the same time.

Sneguireff (*Arch. de Tocol. et de Gynæc.*, Paris, 1892) reports a case in which he utilized a portion of the rectum in the formation of a new vagina. His operation consisted in making an incision through the skin and subjacent tissues along the border of the lower portion of the sacrum and coccyx to the posterior border of the anus. The coccyx was resected transversely across the incision, and with the finger the rectum was separated from the anterior face of the coccyx. The gut was stripped from its surrounding parts, drawn into the incision, and ligated in two places and cut. The superior portion was separated from the bladder and its environments, drawn down to the base and sutured to the right of the resected coccyx. It (*i.e.*, the superior segment of the rectum) was found surrounded by some fibres of the levator ani, and these were secured with it to act as a third anal sphincter. The inferior segment was brought down and its upper end closed by continuous suture, forming the cul-de-sac or cavity of the new vagina. The results of the operation were excellent, and union took place *per primam*. Fourteen days later, a second operation was done for the formation of the vulvar opening. This consisted in making an incision through the fibrous ring situated

between the anus and lower border of the urethra, uniting the rectal mucous membrane by continuous suture to the adjacent parts, and transforming the circular opening into a longitudinal one, surrounded by the labia minora and presenting a striking resemblance to the normal vaginal orifice. Union by first intention. The vagina measured three inches in depth and was capable of a certain amount of contraction. No fæcal incontinence. One year later she wrote that she had perfect control over the bowels and flatus, and that coition was accomplished in a normal manner. (Just what was done with the anus in this case does not appear from the text of the report, nor from the three cuts which accompany it. Apparently, however, the anus was incised anteriorly, so that with its sphincter it constituted the borders of the posterior portion of the introitus of the new vagina.)

With the possible exception of the operation last described, to inquiries concerning the later history of which the operator has failed to reply, these operations seem to have proven quite generally defective, from the ultimate cicatricial contraction of the new canal. The result in Beck's case was unusually good, but even in that after a few months of marital experience the husband deserted his wife.

Mucous membrane long exposed comes to form a very fair substitute for skin; but the converse of this is not true, and a skin-lined vagina must differ very widely from one lined with a normal mucous membrane.

I was recently consulted in the case of a young woman, nineteen years of age, married a little over a year, who some six months before she consulted me had been delivered at term by instruments and after craniotomy. Following her delivery there had been an apparent sloughing of the entire vagina. Healing had taken place, and the perineum was perfectly smooth, except for a very small sinus, so small and tortuous that the smallest probe could not be inserted. No history was obtainable to determine the extent of the sloughing, and the presumption was that we were dealing with a partial atresia of the vagina, for the relief of which a plastic operation might be

made by the usual method. Accordingly, a careful dissection was made upward between the bladder and rectum, but not a trace of vaginal wall could be found at any point. The uterus was finally reached, but no cervix could be made out. The cervix seemed to have sloughed away with the vagina. Douglas's cul-de-sac was opened, and through this the lower segment of the womb could be quite thoroughly outlined. The opening which had thus been made was carefully packed with iodoform gauze, and the patient sent to her room, with the expectation that forty-eight hours later a second operation might be made for the maintenance of the new canal. She absolutely refused,

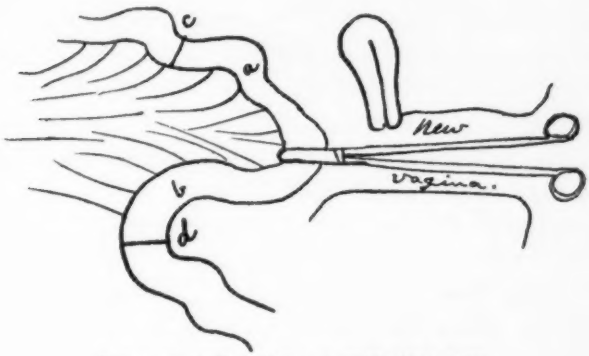

FIG. 1.—*a*, *b*, Sigmoid; *c*, *d*, points for section.

however, to have anything more done (especially as another physician at this stage had volunteered to maintain the patency of the canal by the introduction of a glass plug), and passed from observation.

The method which I had planned to carry out in this case was to utilize for the lining of the new vagina the sigmoid flexure of the colon, or a loop from the lower end of the ileum. The abdomen was to be opened and the sigmoid seized at about its centre by a pair of forceps introduced from below through the new canal and drawn down to the perineum. The length of bowel thus drawn down was next to be detached, with the usual precautions, by a transverse incision through the gut, but without injuring the vessels in the mesocolon, the continuity of

the colon being at once restored by an anastomosis. One end of the vaginal loop would then be inverted and closed by a continuous suture, not penetrating the mucous membrane. By pulling up the fundus of the uterus until the cervix was exposed in Douglas's cul-de-sac (or, if the cervix were absent, the opening into the uterus found), the other end of the bowel would be attached around the cervix by interrupted sutures so as to form a canal for the uterine discharges. The abdomen would then be closed in the usual way, with, if desirable, a drainage wick introduced from above downward through the new canal and just below the loop of intestine. Finally, the patient being placed in the lithotomy position, the loop of bowel still held by the forceps would be opened, the bowel cleansed as necessary, each limb of the loop packed with iodoform gauze, and the edges of the opening in the bowel attached to the surrounding skin.

At the completion of the operation we would have a double vagina, each canal being approximately of the size of the colon, and with the nutrition positively provided for by the integrity of the mesocolon. The gauze would be removed and replaced from time to time as necessary, and at the end of ten days or two weeks the septum between the vaginas could be easily removed by clamp pressure.

Such a vagina would be of ample size, would be lined with normal mucous membrane, would not materially contract, and would serve every purpose save that of child-birth; and it would hardly be prudent perhaps to absolutely deny the possibility of a birth through such a canal, considering the ample capacity of the colon under certain circumstances.

Since having this proposition in mind, I have taken pains in a large number of abdominal operations to notice the amount of available slack in the sigmoid flexure and ileum, and have in all cases found that this would be ample for the purpose suggested. In one instance, through an opportunity offered at a penal institution, I was able to carry out this proposition on the body of an adult male a few minutes after death and while the parts were still in practically a living condition. In this case,

after utilizing the colon and finding it to meet every indication, I drew down the lower end of the ileum and found that to be equally available.

We are all familiar with Ruthkowski's suggestion to utilize the sigmoid flexure in the construction or repair of the bladder;

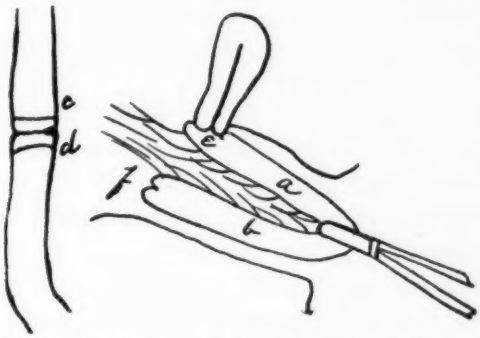

FIG. 2.—*a*, *b*, Sigmoid drawn into new vagina; *c*, *d*, anastomosis; *e*, attachment of one end to cervix; *f*, closed end.

but so far as I can learn a somewhat similar use of the bowel for the construction of a new vagina has not heretofore been suggested. The danger of the operation would be apparently not materially greater than that of an ordinary intestinal anastomosis, and that operation has long since been accepted as an established procedure.

THE USE OF ELECTRICITY IN SKIN-GRAFTING.[1]

BY JOHN D. RUSHMORE, M.D.,

OF BROOKLYN, NEW YORK,

Professor of Operative and Clinical Surgery in the Long Island College Hospital.

THE use of electricity in skin-grafting in a number of hospital patients has been followed by such gratifying results that the subject has seemed to possess sufficient interest to justify its presentation before this Society. The cases in which the method has been applied were all suffering from chronic ulcers, one or two of them very extensive. In none of the patients has the method been used in fresh wounds accompanied by considerable loss of tissue, as we have here a better method in the use of sliding flaps. If we are careful to check the hæmorrhage, secure a well vascularized flap and bring the parts together with little or no tension in the flap, the healing in almost all cases will be satisfactory. When we desire a better cosmetic effect, as in the face, neck, or other exposed parts of the body, a Thiersch or other transplanted flap will many times give a perfect result; although I think the risks of failure are very much greater than with the sliding flap.

It is, however, in the grafting of old granulating surfaces where the improvement in methods is most needed; for, personally, I confess that with the most careful attention to details I have had many partial successes and not a few complete failures. I suspect that my personal experience has not been unique; and that it would be fair to say that in dealing with a chronic ulcerated surface the results of our efforts to heal them with Reverdin's method has not always been such as to satisfy our earlier expectations.

The other side of the picture is furnished by a quotation

[1] Read before the New York Surgical Society, April 27, 1904.

from Hamilton's " Principles and Practice of Surgery." The following remarks comprise the results of the observations hitherto made and in which nearly all observers concur:

" The more healthy the condition of the granulations the better is the chance of success; indeed, with perfectly healthy granulations success is almost certain. It is not material from what point of the body the graft is taken, although it will be found most convenient to take it from some portion which is thin and flexible. With a pair of mouse-toothed forceps the integument is lifted, and with the knife or scissors cut out. It is generally considered essential that the areolar tissue and fat should not be included in the graft; whether this is a matter of consequence or not I am unable to say; but it is certain that it makes no difference how small the piece may be, and it is not necessary to cut so deep as to draw blood. Having cut out a piece as small as can be conveniently removed, we proceed to divide it into several smaller pieces; nor does the amount of contusion which it suffers in the process seem to affect its vitality. After a trial of several methods of inserting the fragments, I have arrived at the conclusion that if the granulations are fresh and vigorous, there is no better way than simply to lay them upon the surface, without attempting to embed them by incision; nor does it seem to be a matter of any consequence how they lie, whether with the raw surface turned in one direction or the other. The grafts, when several are inserted simultaneously, should be placed at intervals of about one inch apart, as it is observed that the limit of growth of each separate piece does not in general exceed a diameter of one inch or thereabout. In order to retain them in place, I have generally used common adhesive plaster, reinforced by a few turns of the roller. If the operation of grafting is made upon the lower extremities, it will be necessary to impose upon the patient absolute rest in the recumbent position." The dressings are removed after two or three days, the sore cleaned with tepid water and soap, bathed with a weak solution of carbolic acid, and subsequently treated in the usual methods applicable to ordinary ulcers.

These results were secured within three or four years after the introduction of Reverdin's method, long before the days of asepsis; while even antisepsis was still ridiculed by some and half heartily adopted by many; with small grafts cut into still smaller pieces; secured in position by a kind of adhesive plaster then in use, that to some patients proved very irritating, and this plaster was removed in two or three days with the expectation that the grafts laid on and not embedded in the granulations would adhere to the surface of the ulcer instead of the plaster. And yet "with perfectly healthy granulations success was almost certain."

In a paper entitled "Recent Researches in Radio-activity and Electricity: Their Bearing on Radiotherapy; Legal status," read at the New York State Medical Society meeting, January 27, 1904, by J. Sherman Wight, one of the assistant surgeons to the Long Island College Hospital, the author draws attention to the value of electricity in skin-grafting. The method of application and the probable explanation of its action are shown in the following extract from the paper:

"I have been able to show that high frequency discharges will clot blood, acting as a hæmostat, and will coagulate serum albumen; but this is in some degree due to the formation of nitric acid from the air; but there is no destruction of tissue with ordinary care. I have made use of this in sealing surfaces after the removal of several diseased areas, especially in the neighborhood of bone and in fixing grafts to granulating surfaces, the results of which have been so uniformly successful in my experience that I now ask attention to the technique of this method of electric grafting. Render the granulating surface sterile; prepare it to receive the grafts by curetting it thoroughly; and, while it is still oozing, place the grafts of any form desired in position on the surface and bathed in blood; apply the high frequency discharge from a pointed electrode at about one-quarter inch distance over the entire surface till clotting is firm and the grafts are fixed in a dry surface. Serum that is squeezed out in the process of clotting should be sponged off. The dressing consists of three per

cent. carbolized vaseline and plain sterile gauze. It is renewed at the end of the third day. The repair follows in the usual way, but takes a shorter course. Repair was hastened in some cases in which the secondary Röntgen rays were used at the end of the first week.

The following cases were subjected to this method of grafting:

CASE I.—A. N., aged forty-two years, liquor dealer, eighteen months ago was operated on for varicose veins of the left leg, and the ulcer on the leg healed in the course of ten weeks. The ulcer reopened in two months, attaining the size of a silver dollar, and was treated, with some improvement, to October 26, 1903. It was then given a three days' preparation with soap, water, and dilute carbolic acid. Reverdin grafts were taken from the thigh and applied by the electric method. At the end of a week the healing surface was exposed to the secondary Röntgen rays for ten minutes. This was repeated at intervals of three days. Repair was complete in three weeks and has remained so.

CASE II.—Mrs. T., aged thirty-six years, recovered from a cellulitis of the right leg with an ulcerating surface extending from the outer malleolus three and one-half inches, down on the dorsum of the foot, and two inches in width. I grafted the surface with Thiersch grafts by the electric method, November 24, 1903. The secondary rays were not used till the beginning of the second week, and only repeated twice, fifteen minutes at a sitting. Repair was complete by December 29, 1903. I have not seen her since.

CASE III.—W. B., aged forty years, mate of a steamship, was admitted to the service of Dr. Bristow at the Long Island College Hospital, Brooklyn, October 11, 1903, suffering with ulcers of both legs, covering the front of the legs and extending around to the calves from the knee to the ankle. The small superficial veins were injected, and the ulcers had increased in severity for the past five months. I saw him on November 27, 1903. There was a high degree of inflammation of both legs. I had them scrubbed with soap and water and washed with alcohol. The same day I grafted the surfaces of the ulcers of the left leg with both Reverdin and Thiersch grafts by the electric method. The next day I grafted the right leg. The dressings were not removed

till December 2, when the secondary Röntgen rays were applied for ten minutes. The legs were not again exposed to the secondary rays. December 23, 1903, the right leg was healed, and January 11, 1904, he was discharged from the hospital with repair complete in both legs.

CASE IV.—O. A., aged twenty-nine years, housewife. Varicose ulcer of right leg just below the patella for four months. She was admitted to the service of Dr. Bristow at the Long Island College Hospital, December 11, 1903. December 12, 1903, ulcer was curetted and bone drilled under general anæsthesia. December 22, 1903, the case was referred to me, and I grafted a surface two and one-half inches in diameter with Thiersch grafts by the electric method. The wound was dressed every third day till she left the hospital, January 3, 1904. She has since come to my office every week and had the healing surface exposed to the secondary Röntgen rays for fifteen minutes. January 25, 1904, the surface was not fully repaired; it measured one-eighth inch in diameter.

CASE V.—E. S. B., aged seventy-three years, first noticed a growth on the tragus of the right ear, January, 1903. It grew larger to about the size of a small almond until August, 1903, when it broke down. It was still discharging, December 29, 1903, when I saw him. I froze the surface with ethyl chlorid, cut off the growth with a pair of scissors, and curetted its base. The high frequency discharge was applied till the surface was dry and a dry dressing put in place. January 4, 1904, the surface was again exposed to the high frequency discharge to fix a small graft in place. January 7, primary Röntgen rays were used for ten minutes. January 12, removal of the dressing started some oozing, and the high frequency discharge was again used. January 18, 20, and 23, the secondary Röntgen rays were used for fifteen minutes, and at the last visit repair was complete, leaving almost no scar. Microscopic examination of the specimen in this case showed the growth to be epithelioma. I shall endeavor to keep the patient under observation for recurrence of the growth.

CASE VI.—K. McQ., aged sixty years, housewife. Admitted to the hospital November 17, 1903, suffering with a carbuncle at the back of the neck. Deep incisions were made November 18, 1903. December 19, 1903, the granulating surface, three by two and one-half inches in extent, was grafted by the electric method.

No secondary Röntgen rays were used in this case, and January 25, 1904, there is still a surface of one inch by one-half inch left to heal.

I am able to add one more case to the above list.

CASE VII.—Male, aged twenty-five years, entered Long Island College Hospital January 4, 1904, with a large ulcer, eight inches long in lower part of right leg, completely encircling the leg except for a strip of skin one inch wide at the back of the leg. The ulcer was the result of a kick of a horse, and had existed eight months; the borders inflamed; over the fibula was a fusiform mass about three inches long and a half-inch thick, which was suspected to be malignant, but which proved to be inflammatory. After about four weeks' treatment to secure a healthy granulating surface, ten grafts from the sterilized skin of the thigh were placed in the surface and the usual protective dressing applied. This attempt failed. About two weeks after this, Dr. Wight, to whom I referred the case, with the surface apparently in the same condition as when I made my attempt, succeeded in having twenty-eight out of thirty-two grafts hold fast and grow secured in position by the electric methods. The Röntgen has been applied twice. The surface now is healing, but slowly.

A study of these seven cases, which are perhaps as instructive as a larger number, and an opportunity to see the application of the electricity, convinces me that we have in this method of grafting a pretty certain way of fixing the grafts, and I doubt if anything more can be claimed for it. It certainly coagulates the blood and secures the graft in its new position. I doubt the benefit of the secondary application of the Röntgen rays, and whether the healing process goes on any more rapidly than in any other way after fixation of the graft. Of course, the resultant scar is the same as in other methods. Why it is that 12½ per cent. of the grafts did not adhere and grow in the last case reported would be as difficult to answer as why the other 87½ per cent. did. Our knowledge of the causes of success will doubtless explain the causes of failure. While successful grafting by Reverdin's method depends on having a surface as healthy as possible, the granulating surface is never perfectly healthy, as pus is never laudable. It is always in-

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fected, and so possibly infective to the grafts; it is quite impossible to sterilize the sore and have it in as favorable condition for grafting as in freshly made surfaces. Successful grafting does not depend entirely, if at all, in vascularization of the graft as proved by the experience of Lusk, who used successfully the epidermic layer from a blister sterilized and kept 418 days before being used as grafts. Nor does the word "epidermization" express exactly what takes place, for Howard used bits of muscle successfully; again, the resulting scar has not the structure of skin, but is like all scar tissue made up of connective tissue free from hair-follicles, sweat, and sebaceous glands, and unfortunately the resulting scar is very prone to break down under very slight injury..

In conclusion, I may state that, in our attempts at healing old granulating surfaces with small grafts, we have in the use of the electric method a more exact and successful way than any heretofore employed, by fixing the grafts on the granulating surface.

TRANSACTIONS

OF THE

NEW YORK SURGICAL SOCIETY.

Stated Meeting, April 27, 1904.

CHARLES L. GIBSON, M.D., in the Chair.

EXCISION OF RECTUM FOR CARCINOMA.

DR. WILLY MEYER presented a man, forty-eight years old, who, when he first came under observation in the summer of 1903, showed all the symptoms of a neoplasm of the rectum. The rectoscope showed a new growth about five inches above the anus; this bled easily, and was typical in appearance of carcinoma.

An operation was proposed, but declined by the patient. He returned some months later, much emaciated; his symptoms were aggravated and the local condition more pronounced. A day was set for the operation, but before its arrival the patient suddenly had an attack of acute intestinal obstruction, with stercoraceous vomiting, and in order to relieve this inguinal colostomy was hurriedly done.

A subsequent examination of the malignant growth in the rectum showed that it was immovable and firmly adherent to the sacrum. This condition usually rendered the outlook of a radical operation unfavorable; but, as the patient and his family were insistent, Dr. Meyer operated by the Kraske method on November 6, 1903. The operation was done in the knee-chest posture, which the speaker said he favored in these cases. After laying open the parts widely, and opening the peritoneum, the growth could be pulled down into view. It could not be brought down far enough, however, to do a resection, and Dr. Meyer thereupon decided to

excise the entire lower rectum and make a sacral anus. He was strongly tempted to close the lower end of the divided gut, leaving it as a blind pouch, and allowing the patient to continue to empty his bowels through the old colostomy wound; but he was restrained from doing this by the presence of a number of hard masses that could be felt above the cut end of the intestine.

Subsequent to the operation, the patient complained of intense pain in the lower bowel. This was so severe that it could not be overcome by even large doses of morphine, and when Dr. Meyer again saw the patient, about twenty hours after the operation, he found that the pain was due to the fact that the sacral anus had become occluded by a large fæcal stone. This, with three or four of the same kind appearing later, had to be removed with instruments. Subsequent recovery was uneventful. To-day the patient has, in addition to the sacral anus, his inguinal colostomy wound, which he is anxious to have closed. Dr. Meyer said he would keep the patient under observation, and if, at the end of a year, the outlook was still favorable he would close the colostomy wound and leave the sacral anus.

In reply to a question as to why the knee-chest posture was preferred at the German Hospital in operating on these cases, Dr. Meyer said it had been introduced there by Dr. Lange, and possessed such manifest advantages over the Sims's position that it had been generally resorted to since. The abdomen was supported by a box-like apparatus, while the upper part of the body rested on the pillows. This gave a very good access to the parts. Hæmorrhage is also much lessened. One possible objection to it was that in cases where the rectum had been accidentally opened or torn, the danger of infection was increased by the gravitation of the intestines towards the diaphragm.

CHRONIC CHOLANGEITIS; CHOLEDOCHOTOMY.

Dr. Willy Meyer presented a woman, fifty-four years old, who entered the German Hospital early in October, 1903. She complained of frequent chills, and had been deeply jaundiced for three months. The stools were clay-colored. The patient was very stout, and had a large irreducible ventral hernia.

Operation, October 15, 1903. On account of the pendulous abdomen, the primary incision through the rectus had to be lengthened in the shape of Kehr's "Wellenschnitt." The fundus

of the gall-bladder was found to be covered with omentum. A stone could be felt in the bladder, and could be traced into a distended viscus which seemed to be the lower half of an hour-glass-shaped gall-bladder. Upon aspiration, yellow, non-smelling gall escaped. The fundus was incised and three stones removed. The finger was then passed from the upper strictured section of the gall-bladder into a lower, larger compartment, which extended so far down behind the duodenum that it was at once recognized as the common duct distended to about the size of a large thumb. Two more calculi were found in the strictured portion of the bladder, and, finally, a round stone, evidently situated in the distended papilla. After the removal of these calculi, a sound was easily passed into the duodenum. Palpation of the hepatic duct revealed another faceted stone at its bifurcation.

The hepatic duct was drained and the common duct closed. On account of the poor condition of the patient, the shrunken gall-bladder was left behind after it had been split, its mucosa cauterized, and one part fastened to the abdominal wall. The patient made an uneventful recovery, and had since enjoyed good health.

DR. GIBSON said that all the biliary calculi in Dr. Meyer's case were doubtless from the same source. Yet the assertion had been made that stones that were formed in the biliary duct were of a different make-up from those in the gall-bladder. Biliary duct calculi were not supposed to give rise to serious obstruction; that is, they never reached that size.

EXOSTOSIS BURSATA OF FEMUR.

DR. WILLY MEYER presented a man, twenty-five years of age, who came under his observation with the diagnosis of osteosarcoma of the thigh. Examination showed a hard mass on the inner side of the left femur. It was soft in parts, and on palpation gave a parchment-like feeling. The patient insisted that the swelling had not existed over three months. The tumor was evidently above the epiphysis, and was irregular in contour. Dr. Meyer said he was inclined to regard it as an exostosis bursata of the femur. This diagnosis was practically confirmed by the X-ray, which showed that the shaft of the bone was normal, and that the growth consisted of an irregular mass, with a pedicle connecting it with the femur.

An incision was made over the mass, which was filled with

fluid and clotted blood. Its pedicle, attached to the femur, was easily chiselled off.

Dr. Meyer said the growth had probably existed longer than the time stated by the patient. Recovery was uneventful, and with perfect use of the leg.

SEVERE LACERATION OF THE ABDOMINAL WALL.

Dr. Charles H. Peck presented a man, thirty-four years of age, who was admitted to Roosevelt Hospital on March 23, 1904, in the service of Dr. Robert F. Weir. About an hour previous to his admission, while working in front of an anvil in an automobile repair shop, an automobile was accidentally started, striking him in the back with great force, and shoving his abdomen against the point of the anvil. He immediately felt very faint, but did not lose consciousness, and was brought to the hospital without delay in an automobile.

On admission, the patient was in moderate shock. Over the left, lower quadrant of the abdomen there was a soft mass, apparently consisting of coils of intestine lying just beneath the skin. Peristaltic movements could be seen and felt. The mass was tympanitic on percussion and could not be easily reduced. The abdominal walls were soft; there was no rigidity. Evidences of contusion of the skin extended as low as Poupart's ligament and the saphenous opening, but there was no wound nor tear of the skin. Pulsation was absent in the left femoral, popliteal, and posterior tibial arteries, but the leg was warm.

Operation, under ether, two and one-half hours after receipt of the injury. A six-inch oblique incision was made midway between the umbilicus and the iliac spine. Immediately underneath the skin, which was avulsed over the entire left lower quadrant of the abdomen from the level of the umbilicus to Poupart's ligament, lay a mass consisting of coils of undistended intestine. There was a complete transverse tear of the entire structure of the abdominal wall beneath the skin, including the peritoneum, from the inner third of the right rectus muscle to the left, to about the anterior-axillary line, the torn structures being the inner third of the right rectus, with its sheath, the linea alba, the entire left rectus and sheath, the external and internal oblique and transversalis, with the peritoneum for a corresponding distance. There was no injury to the intestines or other viscera.

There was a hæmatoma in the left iliac fossa, with a small tear in the retroperitoneum near the pelvic brim.

The posterior peritoneum was incised over the hæmatoma and the common and external iliac arteries exposed; pulsation was normal in the common and internal iliac arteries, much diminished at the commencement of the external iliac, and absent at the level of Poupart's ligament. No injury of the external coat of the artery could be made out; the veins were uninjured. There was a complete transverse rupture of the left psoas muscle, with a separation of its ends of from one and one-half to two inches; the left ureter and the anterior crural nerve lay exposed in the gap, but were uninjured.

No attempt was made to suture the psoas muscle. The posterior peritoneum was sutured and a cigarette drain placed extraperitoneally in the depth of the wound. The anterior peritoneum was then sutured with plain catgut; then the muscles and fascia, layer by layer, with No. 2 chromic gut; the skin was closed with silkworm gut and silk and a dry sterile dressing applied.

The patient made an uninterrupted recovery. The drain was removed on the third day and not replaced. The skin sutures were removed on the seventh day. The wound healed by primary union; the patient was allowed to sit up on the twenty-fifth day, and was discharged, cured, two days later. Pulsation returned in the femoral and posterior tibial arteries about a week after the operation. The limb was never cold nor cyanosed.

DR. HARTWELL, in discussing the possibility of a traumatic aneurism occurring in this case, on account of the contusion to the intima of the external iliac artery, said that last summer he made a number of experiments on animals, and the results were of some interest as bearing on this subject. A needle was inserted through the coats of the artery, and its inner wall scratched with the point of the instrument. The artery was then suspended and subjected to pressure from the inside by a fluid column; and it was demonstrated that a vessel thus irritated would become dilated with a much less pressure than one that had not been subjected to injury.

RETROPERITONEAL ABSCESS.

DR. JOHN A. HARTWELL presented a colored boy, eighteen years old, who was admitted to the Lincoln Hospital on the 21st

of February, 1904. His family history was unimportant. The patient had had varicella in childhood, and five years ago, while living in Virginia, he had what was called "bilious intermittent fever," which lasted about three weeks. Last summer he had measles, and was ill for two weeks. Every winter he gets a "cold," accompanied by cough and mucopurulent expectoration. These attacks usualy last several weeks, and then pass off. His appetite had always been good, but since last September there had been a gradual loss of endurance, although he had not noticed any loss in weight. His bowels had always been regular and he voided his urine normally. He rarely indulged in alcoholic stimulants; he was never injured; denied gonorrhœa and syphilis.

Four months ago the patient was suddenly seized with a sharp, cramp-like pain in the lower abdomen. Its point of greatest intensity was the umbilicus, and it did not radiate. The attack came on without apparent cause and was not accompanied by vomiting, constipation, diarrhœa, or other symptoms, but he thought his abdomen was slightly swollen at the time. The pain persisted about twelve hours, and after its disappearance the belly remained tender for three days. A similar attack occurred about six weeks later; this was milder than the first, lasting only about eight hours, and the belly remaining tender for about two days afterwards. The attack was relieved by taking a Seidlitz powder. No physician was called during either attack.

The patient remained perfectly well until February 17 of the present year, when he was again suddenly taken with a cramp-like, sharp pain in the lower abdomen, most marked over the umbilicus. This time the pain radiated into the left groin and the upper, anterior surface of the left thigh. He passed his urine with difficulty, and had a sharp pain in the posterior urethra on voiding. Four days later, when he was brought to the hospital, he said his bowels had not moved since the beginning of the attack. He was given a soap-suds enema, but with poor results.

Upon admission, the patient complained of pain in the lower abdomen. There was marked abdominal distention; there was considerable muscular rigidity, marked tenderness, and dulness from the left flank towards the umbilicus. Upon examination per rectum, the seminal vesicles were found to be greatly enlarged and exceedingly soft and tender. The patient's temperature was 102° F.; leucocyte count, 12,000; urine, normal. The case was regarded as one of probable tubercular peritonitis.

Operation, February 26, 1904. Under the influence of the anæsthetic, the abdominal muscles became relaxed; and, as the seat of the trouble seemed to be on the left side, where a distinct mass could now be felt, an incision was made over it. Upon exposing the peritoneum, a large retroperitoneal abscess cavity was revealed, which contained about fourteen ounces of thin, whitish pus. The abscess cavity could be followed down behind the sigmoid, and apparently communicated with the enlarged seminal vesicles below.

The wound was drained for a few days, and closed entirely in two weeks. The patient left the hospital, entirely well, less than three weeks after the operation. Six days after the operation, a rectal examination showed that the enlarged seminal vesicles had greatly decreased in size, and before the patient was discharged they were absolutely normal.

Dr. Hartwell said he did not know what, if any, relation the enlarged seminal vesicles had to the retroperitoneal abscess in this case, nor did he know the source of infection. The original theory that it was tubercular was probably wrong, from the fact that the wound healed so promptly and without a resulting sinus.

ACUTE TETANUS TREATED BY MEANS OF INTRANEURAL AND SPINAL INJECTIONS OF ANTITOXIN.

Dr. John Rogers said that about two years ago certain experiments were carried out in the Pasteur Institute in Paris to illustrate the action of the tetanus poison. These experiments went to show that this particular poison exerted all its effects on the ganglia in the spinal cord. They also demonstrated that it could only reach the spinal cord through the motor nerves, and that its progress in these nerves depended on the integrity of the axis-cylinders.

Further experiments along this line demonstrated that the tetanus toxins could only reach the spinal cord through the motor nerves, and that in animals a fatal inoculation of the poison into one of the extremities could be checked by intraneural injections of tetanus antitoxin. It was shown that the poison could only travel centripetally in the motor nerves, and that it could not travel at all through the sensory nerves. It was also shown that if the poison was introduced directly into the spinal cord, tetanus

occurred within a few hours. Its only mode of entrance into the motor nerves was through the muscle-end apparatus.

The patient shown by Dr. Rogers was a boy, twelve years old, who on the 17th of March, 1904, received a shot-wound of the hand. The injury, which was inflicted by a toy pistol, was treated in some hospital, where a wet dressing was applied. Five days later his family physician removed a piece of gun-wad from the wound.

On April 1, about sixteen days after the receipt of the injury, the boy began to experience some difficulty in chewing. On the following day this difficulty increased, and his walk became peculiar. On Sunday, April 3, two days after the onset of his symptoms, he had a severe convulsion and complained of cramp-like pains. When Dr. Rogers saw the patient that night, the body was perfectly rigid; there was marked opisthotonus and every sign of acute tetanus. He immediately exposed the left brachial plexus, isolated each one of the nerves, and injected into each about five or ten minims of tetanus antitoxin. Altogether, about twenty minims were injected into these nerves. In addition to this, sixty minims were injected directly into the spinal cord.

The following morning the patient's muscles were somewhat relaxed, so that he was able to roll about in bed. His jaw, however, was still somewhat rigid, and it was decided to repeat the treatment. The wound in the axilla was reopened and an injection was made into one of the nerves of the brachial plexus, followed by a spinal injection.

On the following day, the rigidity of the muscles had entirely disappeared, and, with the exception of extreme weakness, the patient was very comfortable. From that time on he made an uninterrupted recovery.

Dr. Willy Meyer asked Dr. Rogers whether he thought the same good results would have been obtained by injecting the antitoxin into the subarachnoid space only, instead of into the spinal cord and brachial nerves; and if it made a difference whether the antitoxin travelled over the same route as the poison or not? The speaker recalled one case where recovery followed the injection of the antitoxin into the cord only, although others had reported failures after the same method.

Dr. Rogers said that, in making the spinal injections, it was important to scratch the cord or one or more of the nerve filaments

F. Tilden Brown's case of benign gastric ulcer (posterior wall). Drawing presents the peritoneal aspect of the tissues and ulcer excised.

with the point of the needle, so that the antitoxin would enter the cord. Simple injection into the subarachnoid space without making any abrasion of the cord itself was of no more value than if it were injected subcutaneously. Injecting it into the ventricle of the brain was absolutely valueless, as the experiments mentioned before proved that the toxin could not diffuse downward, and all the facts known seem to show that the antitoxin follows the same paths.

In reply to a question as to whether his patient had received any treatment in addition to the injections of antitoxin, Dr. Rogers said he had been given sixty grains of bromide of sodium and thirty grains of chloral, in divided doses, on the second day of the disease. The delay in the onset of the acute symptoms in this case was probably due to the site of the inoculation of the poison.

Dr. Rogers said that while the inoculations into the brachial nerves might have been sufficient, he did not feel confident enough of that fact to omit the injections into the spinal cord. In cases where he injected the spinal cord only, the patients had died.

THE USE OF ELECTRICITY IN SKIN-GRAFTING.

Dr. John D. Rushmore read a paper with the above title, for which see page 404.

A POSTERIOR WALL GASTRIC ULCER.

Dr. F. Tilden Brown said that, by the courtesy of Dr. F. H. Markoe, he had the opportunity to show an autopsy specimen revealing what followed an operation of his own done three years previously, at Trinity Hospital, for a perforating gastric ulcer. Six weeks after the operation the patient appeared to be well, and he was presented before the Society at its February meeting in 1899. Gradually gastric symptoms recurred and on September 28, 1902, he entered the New York Hospital with symptoms of pyloric obstruction, for which a gastrojejunostomy was done. He died five days later. At autopsy the site of the original gastric ulcer showed much nearer the pylorus than was expected, and the intestine originally found adherent to the margin of and occluding the ulcer was pretty certainly the transverse portion of the duodenum.

At the speaker's operation, an incision between ensiform and umbilicus revealed a mass behind the stomach. Access was had

to it through the gastrocolic omentum. The stomach was drawn out and turned upward after separating the adherent duodenum, when a one and a quarter inch by three-quarters inch ulcer was exposed on its posterior wall. Surrounding induration required excision of tissue, shown in the drawing. The muscular coats were approximated with two layers of chromic gut suture and the serous coat with two of silk. Then a strip of sterile gauze was laid over the suturing and the stomach turned back. This aim to provide for existing or subsequent soiling was an error, and probably explains both the considerable diverticulum seen in the specimen, and which in time led to the necessity for a second operation. For after the first this strip of gauze was gotten out only after very considerable traction made at each subsequent dressing, and in its semicircular wrapping of the stomach it is quite probable that the gradual traction tore apart the gastric wound; but immediate agglutinating contact of the left lobe of the liver and pancreas prevented escape of gastric contents, and the excavations in these viscera, as is now shown in the specimen, continued to act as the limiting walls of a constantly increasing cul-de-sac which in turn exerted sufficient pressure upon the pylorus as to all but occlude it.

That part of the post-mortem notes of most interest is as follows: Firstly, in connection with the last operation under the caption, "Intestines." At a point seventy-three centimetres from its origin, the jejunum is attached to the posterior wall of the pyloric end of the stomach, and communication between the two is established by means of a Murphy button. There is no leakage at the point of anastomosis. The loop of jejunum between origin and point of anastomosis hangs downward a distance of about fifteen centimetres into the left iliac region. It is hyperæmic and distended with fluid of fæces to a diameter of five centimetres.

Stomach. The stomach is not apparently enlarged; its measurements are thirty-three centimetres along the greater curvature and ten centimetres along the lesser curvature. Corresponding to the adhesion of the left lobe of the liver to the stomach there is a large, old ulcer just a little to the left of the pylorus. It measures one and one-fourth by two centimetres in the long axis of the stomach and five centimetres in the opposite direction. The edge of the ulcer is but slightly indurated, deeply undermined and rounded, quite smooth, and appears to have a covering of mucous

membrane. The entire thickness of the stomach is destroyed over the whole ulcerated area. The base of the ulcer being formed by dense fibrous tissue which is firmly attached to the pancreas and left lobe of the liver. The cavity resulting from this ulceration measures 7 x 3 x 2 centimetres. The ulcer involves the lesser curvature and a little more of the posterior than of the anterior wall. The long measurement being at right angles to the long axis of the stomach. The posterior wall of the pylorus is thickened to the extent of one centimetre, and forms part of the wall of the ulcer. The pyloric orifice appears as a vertical slit-like opening which can be forcibly enlarged, but under natural conditions would probably interfere materially with the passage of food. The inferior portion of the pyloric end of the stomach pouches to the right of the pylorus about two and one-half centimetres (and it is into this pouch that the anastomosis was made), a little below and to the right of the pylorus.

Microscopic examination. The thickening of the pylorus is due to an abundance of racemose gland tissue and increase of fibrous tissue in submucous and muscular layers. Mucous membrane at the edge of ulcer is inflamed, but there is no evidence of malignancy.

TRANSACTIONS

OF THE

PHILADELPHIA ACADEMY OF SURGERY.

Stated Meeting, May 2, 1904.

The President, HENRY R. WHARTON, M.D., in the Chair.

MULTIPLE NEUROMATA OF THE ARM.

DR. JAMES K. YOUNG exhibited a man of sixty-four years who has always enjoyed good health. Thirty years ago a subcutaneous nodule appeared in the bend of the left elbow over the line of a nerve-trunk. A second one appeared later in the axilla, and then others on the inner and outer aspects of the arm. There are now nine large and several small tumors, the last of which appeared one year ago. (Fig. 1.) They are exceedingly painful, but Dr. Young is inclined to regard them as pseudoneuromata that can be shelled out by operation. The case is a rare one because the new growths are confined to the one extremity and to the distribution of a single nerve.

DR. FRANCIS T. STEWART has operated upon a similar case within the past month. Seventeen tumors were removed from the flexor surface of the arm and forearm. One pathologist pronounced them to be fibromata, and a second reported them as leiomyomata. Clinically they presented the characteristics of fibromata. Some of them were connected with nerves, but the majority were not so related.

DR. WILLIAM J. TAYLOR mentioned the case of a woman upon whom he had operated five times in thirteen years, removing in all thirty-two neuromata from the internal plantar and posterior tibial nerves. In size the tumors varied from that of a small pea to a large filbert. The condition of the foot was so peculiar and pain from pressure so severe that the patient had been known to fall from a chair when a finger-nail was drawn over the tumors; at

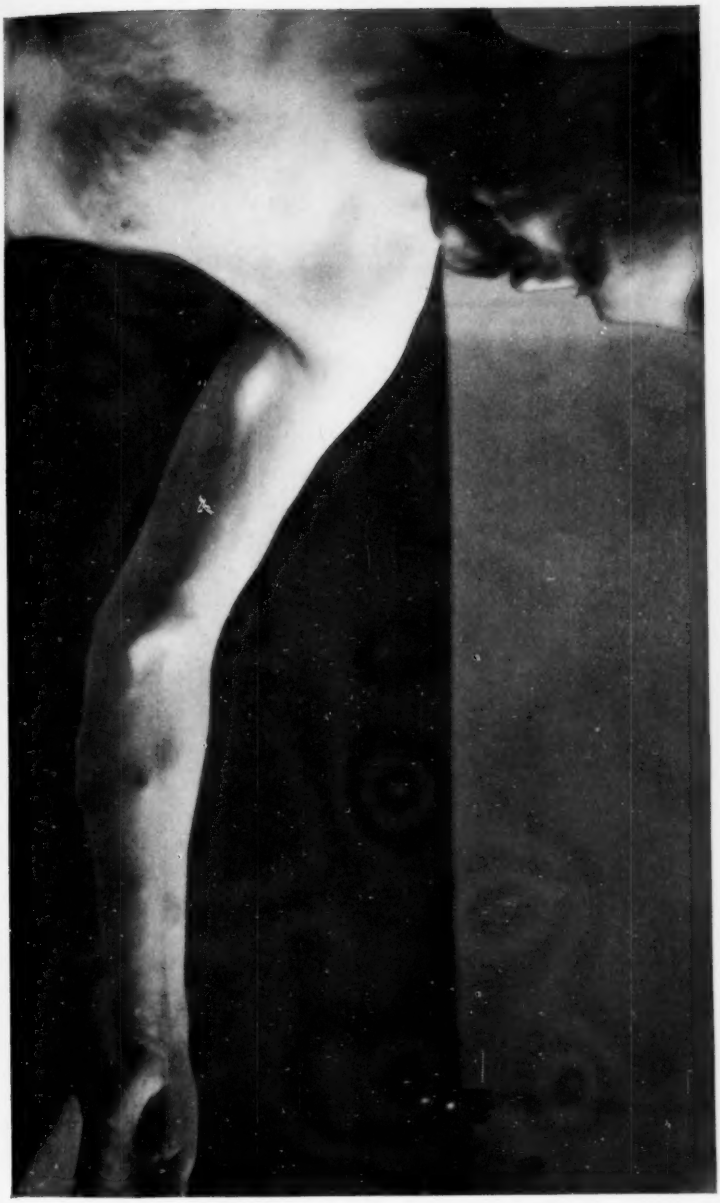

Fig. 1.—Multiple neuromata of arm.

such times large drops of sweat would exude from the skin of the foot. No relief followed repeated removal of the tumors, and finally eight inches of the internal plantar and posterior tibial nerves were removed. Since that the patient has been perfectly well. A careful examination of the tumors by Dr. Spiller showed them to be neuromata. The symptoms in Dr. Young's patient are so different, that Dr. Taylor is inclined to regard the growths as fibromata rather than neuromata.

FRACTURE OF THE LOWER EXTREMITY OF THE RADIUS, WITH ANTERIOR DISPLACEMENT OF THE LOWER FRAGMENT.

Dr. Francis T. Stewart showed two skiagrams of fracture of the lower end of the radius in which the lower fragment was displaced to the palmar side. The patient was a man of fifty years, who had received a blow from a heavy weapon upon the back of the wrist. He thought the injury was only a contusion, and treated it for several days with local application before appearing at the hospital. The injury was treated on a Bond splint.

Dr. John B. Roberts mentioned two recent cases in which the fracture was the same as that described by Dr. Stewart. The first was that of a lady who was thrown from a horse and struck on the back of her hand in such a manner as to drive forward the lower fragment of the fractured radius. Six years ago he saw a similar condition in a man, but does not recall the manner in which the injury was received. The fracture in neither instance had been recognized by the attending physician. Dr. Roberts believes that this fracture is usually not recognized, although it seems there should be no difficulty in the diagnosis. He illustrated by diagrams an easily recognized point in diagnosis which simply depends upon the character of the deformity. As compared with a true Colles's fracture, the deformity is more like that of a gardener's spade than that of a silver fork. This fracture should not be called a Colles's fracture, as that name implies a posterior displacement of the lower fragment of the radius. It has been called a Smith's fracture and a reversed Colles's fracture. He showed a number of casts, photographs, and skiagraphs, as well as two specimens from the Mütter Museum, illustrating this injury.

MOYNIHAN'S CLAMP AND SPLIT-EYED NEEDLES FOR USE IN GASTRO-ENTEROSTOMY.

Dr. William J. Taylor, for Dr. W. W. Keen, showed these instruments. Dr. Taylor in this connection stated that some time since, when desiring to use similar needles, he took split-eyed or calyx-eyed needles, took out the temper, bent them to the desired shape, and retempered them. He found them very satisfactory, in a certain sense answering his purpose better than those of Moynihan.

RUPTURE OF GALL-BLADDER, WITH PROFOUND TOXÆMIA.

Dr. John H. Jopson reported a case of cholelithiasis with rupture of the gall-bladder and extensive peritonitis in a woman of fifty-one years, and the development, after operation, of a peculiar form of toxæmia, with delirium. There was a history of acute cholecystitis seven years before, and of attacks of gall-stone colic somewhat over a year ago, with persisting impairment of health and strength, pain, and indigestion. Preceding rupture, there was an attack of very severe colic lasting over two days, and followed by symptoms of general peritonitis and collapse, with fever and leucocytosis. Operation, seventy-two hours after the onset of colic, revealed a large quantity of bile in the abdominal cavity, and extensive peritonitis, many fresh adhesions, and pockets of bile and mucus as far down as the pelvis. The exact site of perforation in the collapsed gall-bladder was not located. There was an oval stone the size of a date-seed in the first portion of the cystic duct. After drainage of the gall-bladder and peritoneal cavity there was prompt improvement in the local and constitutional condition, and a gradual fall in the leucocyte count, with rapid disappearance of the slight jaundice present before operation. There was no obstruction of the common duct. Immediately after operation the urine contained a moderate amount of albumen, and many casts and some bile were secreted in good amount, and the abnormal constituents gradually disappeared. The pulse remained rapid for ten days. Nine days after operation, the patient became delirious. Her mental condition and general appearance closely resembled those sometimes observed in alcoholic subjects after accident or operation, although there was

no alcoholic history. The face was flushed, the tongue coated, the mind wandering, with hallucinations and delusions. She was very restless at all times, but especially at night, when she was restive and abusive, and required constant watching and restraint to keep her from removing her dressings and from getting out of bed. There was no tremor. The temperature remained at or near the normal line, except for a slight evening rise for a few days, due to slight infection of the pelvic sinus and a stitch abscess. There was free drainage of bile from the gall-bladder. The mental symptoms lasted for a week, at the end of which time they passed off rather quickly. The drainage was removed from the gall-bladder after two weeks. Its removal was followed by a rise of temperature, irregular fever, and occasional chills; it was reintroduced ten days later, and retained for a week, when it was permanently removed, the convalescence being thereafter uninterrupted.

RUPTURE OF THE GALL-BLADDER, WITH GALL-STONES, AND AN ABSCESS PRODUCING PROFOUND TOXÆMIA.

Dr. William J. Taylor reported the case of a married woman aged sixty-four, who had always been well and strong, and who gave no history of fevers, digestive disturbances, nor previous abdominal pain. One sister died at about the same age of what was said to be gall-stones, although there had been no operation to determine this, nor post-mortem examination made. Four weeks before her admission to the hospital, the patient was suddenly seized with pain in the region of the liver and gall-bladder, which was extremely severe in type, and continued with but slight intermissions. She had never been jaundiced, nor especially constipated, and beyond abdominal pain, tenderness, and some fever, there had been no marked symptoms. Her temperature when first seen was 102° F.; there was some rigidity of the right rectus muscle and no abdominal distention, although the belly was full. There was great tenderness, and an indistinct mass over the region of the liver and gall-bladder; the tenderness extending down into the iliac fossa. Her pulse was 80, her tongue fairly clean, and there had been no vomiting. The next day, as her local conditions had not improved materially under fractional doses of calomel, although her temperature had

fallen to the normal, he operated. The liver was much enlarged and covered with lymph. Quite a large quantity of thin, but glairy, yellowish-green pus to the amount of five or six ounces welled out as soon as the peritoneum was opened. There was an immense number of adhesions, and at the edge of the liver over the region of the gall-bladder an abscess was found. There were so many adhesions, that it was difficult to determine the exact relations of the parts. In what had the appearance of an abscess cavity at the depth of two inches a large gall-stone could be felt. This, after considerable dissection through the adhesions, was taken out, and four or five smaller stones were also removed. The gall-bladder was now seen to be ruptured and completely disorganized. All that remained of the gall-bladder was dissected away, and the wound packed with iodoform gauze; a wick of gauze was also passed down into the pelvis for drainage. She had little or no shock following the operation; her temperature once reached 102° F., then fell to the normal line, and remained so for one week, when it again arose to 100° F. for a few days, and again became normal. Almost immediately from the time of operation she showed evidences of a profound systemic toxæmia, such as he had never seen before. Up to the time of operation there were no evidences of anything but a local disturbance, the tongue was heavily coated, almost black, the mouth dry and parched, and this was so pronounced that she could swallow only with difficulty. She was dull, somnolent, and apathetic, but could be roused to answer questions. Her face was very much flushed, but there was no marked jaundice, although the skin was yellowish. She gave the appearance of one who had been on a protracted alcoholic spree, but she was absolutely temperate in all of her habits, and had never been a drinking woman. There were no abdominal symptoms of moment; she complained of little or no pain, and the whole course of her illness was rather against this condition being produced by an ordinary septic intoxication. The fact that the gall-bladder wall was destroyed might have been a producing factor in this profound toxic state. Certainly the toxæmia was one of a very unusual character, and the symptoms not those usually found in septic infection.

The operation was performed on February 24, 1904, and the wound was entirely closed by April 4, when she left the hospital apparently in perfect health.

(1) RUPTURE OF THE GALL-BLADDER IN ACUTE CHOLECYSTITIS. (2) RUPTURE OF A BILE-DUCT FOLLOWING CHOLECYSTOTOMY WITHOUT DRAINAGE.

DR. ROBERT G. LE CONTE said that in briefly reporting these two cases, which of themselves are not of any great surgical interest, he did so as an antithesis to the two cases reported by Drs. Jopson and Taylor, in which a certain group of toxic symptoms were present, attributed to the presence of bile in the peritoneal cavity. In the cases he was about to report these toxic symptoms did not appear.

CASE I.—L. L., aged thirty-one years, laborer, born in Italy, was admitted to the Pennsylvania Hospital, December 21, 1903, with the diagnosis of acute suppurative appendicitis. Patient had been ill for three days with pain in the right side of the abdomen, rigidity of the right rectus, considerable tenderness, chills, fever, and vomiting. On admission his cheeks were flushed, tongue clean, no jaundice, chest negative, liver dulness increased, extending from the fourth interspace to two inches below the costal margin. Abdomen slightly distended; great tenderness of the upper right quadrant; marked rigidity of the right rectus. No tumor could be outlined in the region of the gall-bladder owing to the tenderness and rigidity. The appendiceal region was negative to examination. *Urine,* slight trace of albumen, hyalin and granular casts, no bile pigment, leucocytes 12,500. Widal reaction slightly suggestive. Temperature varied from 101° to 103° F. Diagnosis, acute suppurative cholecystitis. Operation refused.

Treatment consisted of an ice-cap to the abdomen, milk diet, with the exhibition of small doses of calomel and phosphate of soda. In a week the temperature had dropped to normal, the pain disappeared, but slight tenderness and rigidity persisted. By the end of the second week tenderness and rigidity had also disappeared and the patient seemed to have entirely recovered. He refused to remain longer in the hospital, and was discharged January 7, 1904.

Readmitted January 16, 1904. Abdominal symptoms practically the same as on previous admission, temperature ranging from 102° to 103.5° F.; urine negative; leucocyte count, 10,400.

January 18. Ether was administered and incision made in the right rectus muscle over the gall-bladder. The gall-bladder was found firmly embedded in a mass of adhesions and covered

by the colon. On separating these adhesions a pericystic abscess was found in the region of the neck of the gall-bladder, perforation of that organ having taken place just above the cystic duct. The abscess outside of the gall-bladder contained perhaps one ounce of pus, while the gall-bladder itself was distended with a purulent secretion. After swabbing out this pus, the adhesions about the cystic and common ducts were found so dense that it was thought inadvisable to attempt an exposure of these ducts or to attempt an excision of the gall-bladder. An opening was made in the fundus of the gall-bladder and a rubber tube passed to its lowest point. Another rubber tube was passed to the bottom of the abscess cavity outside of the gall-bladder, and some iodoform gauze wicks were also introduced. Two silkworm-gut sutures partially closed the abdominal wound. Recovery was uneventful. The temperature soon fell to normal; pain disappeared; pus was discharged freely for a week without a trace of bile. At the end of six days the gauze wicks were removed, and at the end of two and one-half weeks the rubber drainage tubes also. At the end of two weeks the purulent discharge had ceased and bile was flowing freely through the drainage tubes. He was discharged with a very small sinus discharging bile on February 19, the rest of the wound having entirely healed.

In reporting the second case, he called attention to the fact that the operation was undertaken five years ago, at a time when the advantages of drainage of the gall-bladder were not perfectly understood, and that the operation performed in this case—the so-called ideal operation—cannot be justified in the light of our knowledge of to-day. He was led to do it at that time on account of having had two cases previously that made uneventful recoveries, in which the pathological lesions were similar to this one.

Case II.—I. G., aged forty-five years, a Russian, was admitted to the medical wards of the Pennsylvania Hospital in August, 1899. He gave a history of cholelithiasis extending over a period of more than six years, with from two to three sharp attacks of colic each year. On admission jaundice was visible in the conjunctivæ and in the skin over the chest and abdomen. Liver dulness was not increased; palpable tumor in the region of the gall-bladder, with tenderness and rigidity of the upper right rectus muscle, but no fever.

Operation, August 18, 1899. Incision through right rectus; universal adhesions about the gall-bladder and ducts; gall-bladder much distended, filled with gravel varying in size from sand to buckshot. Cystic and common ducts also distended with same material. This material was removed, and the gall-bladder and ducts flushed with salt solution; gall-bladder was then closed with catgut sutures and the abdomen closed without drainage. The jaundice disappeared, and the recovery was uneventful. Discharged September 11, 1899.

Readmitted September 18, 1899, one week from the previous discharge, with abdominal pain and tenderness in the epigastric and right hypochondriac regions; much jaundice; vomiting; increasing distention of the abdomen and rigidity of the right side. September 21, as Dr. Le Conte was absent from the city, an incision was made alongside of the old scar by Dr. T. S. K. Morton. On opening the abdomen bile immediately escaped. Many adhesions were present. The gall-bladder was exposed, but no rupture could be found, and the scar at the fundus from previous operation was sound. Owing to the adhesions, the cystic and common ducts were not well exposed, but with such exploration as was made no rupture could be demonstrated. The abdominal cavity was washed out and packed with iodoform gauze. The recovery was uneventful. The amount of bile discharged from the wound grew less and less, and in three weeks had entirely ceased. He was discharged October 18 with a small granulating area in the region of the wound.

In view of the fact that jaundice was marked and that the exposed portions of the gall-bladder, especially the seat of the previous incision, were found sound, he judged that some portion of the common duct had ruptured, owing perhaps to some kinking due to the many and firm adhesions surrounding it.

Dr. Le Conte further remarked that so many cases had been reported where bile was present in the peritoneal cavity without producing profound toxic symptoms, that one must eliminate many other factors before concluding that such toxæmia is caused by the peritoneal absorption of bile. As in appendicitis, such symptoms can readily be produced from the presence of septic material in the bile, or, as in uræmia, from the lack of eliminating powers of the kidney. Again, if no bile is entering the intestine, the possibility of auto-intoxication from intestinal contents would have to be eliminated. To his mind such profound toxæmia is

more likely to have been produced by absorption of purulent products by the peritoneum, which products were perhaps not eliminated by the kidneys. Under such circumstances the presence of bile in the peritoneal cavity would be simply a coincidence and not a causation of the symptoms.

ACUTE CHOLECYSTITIS WITH GALL-STONES IN A GIRL OF SEVENTEEN.

Dr. E. Hollingsworth Siter reported the history of a girl, aged seventeen years, who was admitted to St. Agnes's Hospital, February 10, 1904, with the following history: On February 5 (five days ago) patient was seized with pain, of a severe character, about the umbilicus, followed by vomiting. The pain rapidly spread over the entire abdomen, and in thirty-six hours localized itself over the appendiceal region. Vomiting was not fæcal, but contained bile. There had been no constipation and no jaundice.

Examination of the patient shows her lying on her left side with the right leg flexed. Palpation showed slight rigidity more marked on right side, abdomen was slightly distended and somewhat tympanitic.

An incision was made over the gall-bladder and extending down towards the appendix. The gall-bladder was found greatly distended, and upon being opened a large amount of fluid and several stones were found. The stones were slightly smaller than a split pea. The appendix was examined and found gangrenous. It was removed.

The patient made an uninterrupted recovery, but continued to discharge small stones until the eighth day after the operation.

Dr. Francis T. Stewart, speaking with reference to toxæmia following operations for cholecystitis, referred to a case under his care. The patient when admitted was suffering from symptoms that indicated violent cholecystitis. The condition came on acutely at 11 A.M., and operation was performed at 8 the same evening. Pus was found in the gall-bladder, and in the cystic duct was an impacted stone. The temperature was 102° F. before operation. Afterwards the tongue became coated, the face was flushed, and delirium developed. Later there was hæmorrhage from the bowel, the spleen became enlarged, the Widal reaction was positive, and rose spots appeared, the patient passing through a typical attack of typhoid fever. Cultures from the gall-bladder showed the

presence of streptococci. Dr. Stewart also mentioned a case in which he assisted Dr. Morton. The symptoms were those of an acute abdominal catastrophe, and the abdomen was found to be filled with bile. The bile was allowed to drain from the abdominal cavity, and it was not known if rupture of the gall-bladder had occurred. The patient went on to recovery without developing any evidence of toxæmia.

Dr. W. Joseph Hearn stated his belief that bile in the peritoneal cavity produces no more toxic effects than does any other foreign body. He cited the case of a man who was shot through the gall-bladder, with consequent escape of bile into the peritoneum; no toxæmia referable to the presence of bile developed. Cases of toxæmia similar to those reported are due to streptococcus or staphylococcus infection in addition to the bile.

Dr. John H. Gibbon cited cases of Dr. Willard and others in which bile from a ruptured normal gall-bladder had remained in the peritoneal cavity for long periods of time, in Dr. Willard's case for many months, without producing untoward effects. He agrees with Dr. Le Conte that micro-organisms produce the trouble in the beginning, and also the subsequent toxæmia. Intoxication results from the release of pent-up material in the gall-bladder.

Dr. John H. Jopson stated that he did not mean to imply that the symptoms in his case were due to absorption of bile, as he is not sure that they were. They came on a week after the bile was drained. As to septic infection, however, granulations had formed and walled off the wound, and the leucocyte count was falling, conditions in which one would not expect to find infection. He thinks that the symptoms were not due to an ordinary infection. Usually, bile is very well borne by the peritoneum.

Dr. William J. Taylor stated that he had reported his case simply as one of profound toxæmia which came on some time after operation and lasted a week or ten days. He has never seen any other intoxication resembling it.

Dr. Gwilym G. Davis detailed briefly the case of a man of seventy years who had gangrene of the gall-bladder which contained a calculus. An abscess outside of the gall-bladder was also present. The abscess was evacuated, the bladder removed, and drainage instituted. The patient did well for a week or two, then developed delirium, and later insanity. Death finally ensued. There was no evidence of peritonitis or sepsis.

Dr. Robert G. Le Conte said that the urine report in the case presented by Dr. Jopson was interesting and very suggestive. Previous to the time of the appearance of the toxic symptoms in the patient the analysis of the urine showed albumen, casts, and granular débris to be present. Coincident with the appearance of toxæmia, the urine cleared up and was apparently normal, suggesting, perhaps, that, owing to the failure of the kidneys to eliminate the toxic material in the blood, the constitutional symptoms of toxæmia had presented themselves. In other words, that as long as the kidneys were excreting the toxic products in the circulation no constitutional symptoms were present, but the moment they ceased this elimination the symptoms of toxæmia appeared.

SUPPOSED CARCINOMATOUS OBSTRUCTION OF THE PYLORUS NINE MONTHS AFTER POSTERIOR GASTRO-ENTEROSTOMY.

Dr. John H. Gibbon presented a woman, thirty-eight years of age, saying that his reason for reporting this case was that it illustrated the difficulty of making an accurate differential diagnosis between gastric cancer and ulceration of the stomach where there is a large amount of infiltration about the ulcer, and also the advisability of performing gastro-enterostomy even where the operation may seem useless because of the extent of the supposed malignant disease.

The patient was seen with Dr. Gamble and gave a typical history of gastric ulcer extending over eight years. Her family and previous history were of no particular interest. For eight years the patient had suffered from attacks of vomiting and gastric pain. She had also suffered pain soon after eating. The attacks grew worse, and six years ago she was confined to bed by one of them for three months. During this attack she had two hæmorrhages from the bowel, followed later by the passage of clots. She states that she passed no blood after this time. A year later she had another attack, which kept her in bed for a month. In both of these attacks there was severe pain in the right side and in the back. Two years ago she had an acute attack of vomiting and was very ill. The material vomited was very dark and said to contain blood. This is the only attack of hæmatemesis which the patient has had. During this attack she was confined to a hospital

in Philadelphia for six weeks, the diagnosis of gastric ulcer being made. In January, 1903, the patient was able to return to her work as a housemaid, at which she continued uninterruptedly until four days before Dr. Gibbon saw her, July 29, 1903. Three weeks before he saw her she began to have trouble with her digestion, and occasionally vomited a moderate amount, which greatly relieved her discomfort. During these three weeks she had more or less pain located above and to the right of the umbilicus, a feeling of distention of the upper abdomen, and constipation. When first seen by Dr. Gibbon she had a great deal of gastric pain and tenderness. The stomach was distended and contained a large amount of liquid food, which the patient had been able to take without any recent vomiting. The lower border of the organ extended some inches below the umbilicus. After examination of the abdomen the patient vomited an enormous amount of dark liquid, after which the stomach could not be outlined, and the patient felt more comfortable. At this time it was noted that there was a sense of resistance above and to the right of the umbilicus.

The patient was admitted to the Pennsylvania Hospital on July 29, 1903, and for eight days was fed entirely by the rectum. The second day after admission she vomited, the vomitus containing a quantity of undigested food and berry seeds, eaten some time before. The stomach was washed out at this time, and vomiting did not recur for some time. On August 1, after a test meal, there was found free hydrochloric acid, total acidity 65, combined acids 36, no lactic acid. The hæmoglobin at this time was 71 per cent. For the next three or four days the patient vomited a number of times, and the vomited material was found to contain blood. No blood was present in the stools, however. On August 7 Dr. Gibbon determined to do a gastro-enterostomy, and expected to find a benign obstruction of the pylorus. When the abdomen was opened, there was a mass involving the pylorus about the size of a lemon, which was hard and appeared to be a cancer. The glands of the lesser omentum were very numerous and large. The patient was not in the best condition, and it was thought unwise at this time to do a partial gastrectomy. A gastro-enterostomy after the method of Moynihan with the Doyen forceps was done, and it was hoped that if the patient recovered from this operation that a partial gastrectomy might later be performed. The patient made a good recovery from the operation, and on the second day was

able to take and retain liquid food. On the fifth day after operation, preceded by a night of considerable pain, there was some distention of the abdomen, which was relieved by an enema; the result of the enema was a large, dark-colored bowel movement. The patient continued to complain of considerable pain at night in the right side of the abdomen. On the tenth day after operation she vomited a small amount of brownish fluid containing small blood-clots. Twenty days after operation there developed a phlebitis of the left leg. This, however, subsided after a day or two, and the patient's condition was much better. On the 11th of September the patient was out of bed and doing well. She was discharged from the hospital on the 21st of September, 1903, a very unfavorable prognosis being given to her relatives. On the 14th of October she had gained both weight and color, felt perfectly well, was eating everything that she cared for, and her only complaint was the swelling of her leg. This was relieved, however, by an elastic bandage. On the 10th of February, 1904, the patient was seen again and presented no gastric symptoms whatever. She had continued to gain in weight, but complained of some pain in the epigastric region and back, which, however, was uninfluenced by the taking of food. This disappeared, and the patient resumed her work as a chambermaid. The pain in the back, however, was sufficient to make her discontinue the work after three weeks. During all this time she continued to take ordinary food without the slightest discomfort. At the present time the patient states that she is entirely free from pain, has no gastric symptoms, and has gained much in weight. Palpation of the abdomen does not reveal any mass whatever in the pyloric region, and the patient's appearance is that of a healthy person.

In view of the condition of this patient nine months after operation, it is thought that she undoubtedly did not have a cancer at the time of operation, but a pyloric ulcer with extensive infiltration about it. It is thought that the case shows the advisability of exploratory operation even where a supposed cancer of the stomach has advanced to the point where it can be palpated through the abdominal wall, and also that in such instances, where there may be the slightest doubt as to the diagnosis, a gastro-enterostomy is advisable.

Dr. Gibbon also referred to another case of perforated gastric ulcer which he reported before the Academy last fall, and reported

in "American Medicine," in which the condition of the stomach about the ulcer so closely resembled a malignancy that, had not perforation been present, a diagnosis of gastric cancer would have undoubtedly been made. This patient was operated upon October 1, 1903, and is now in perfect health.

MR. COLLINSON, of Leeds, England, noted particularly the statements of Dr. Gibbon that the glands in the lesser omentum were involved; enlargement of these glands is quite constantly seen in cases of ulcer of the stomach, and if, in addition, there is extensive induration, one is apt to be led to the diagnosis of malignant disease. The case reported by Dr. Gibbon emphasizes what has been said by Robson, Moynihan, and others, and no doubt explains the remarkable way in which supposed cancer of the pylorus is cured by gastro-enterostomy, the explanation being simply that such cases are in reality those of severe gastric ulcer. The after-history of occasional vomiting by Dr. Gibbon's patient is also interesting. In many cases one sees after operation these attacks, which later entirely disappear. Mr. Collinson is not sure of the explanation of this phenomenon, as it occurs even when the anastomosis is made at the lowest part of the curvature of the stomach, a point which is much insisted upon by experienced surgeons. Vomiting more frequently occurs in cases where the anastomosis is not made at the most dependent point, but the fact that it does sometimes occur in ideal cases is proof that the site is not alone responsible for this annoying sequel.

DR. RICHARD H. HARTE reported briefly a case similar to that of Dr. Gibbon's. The patient was a man about forty-five years of age, who had a large indurated mass in the pyloric region simulating malignancy, and his age lent weight to this supposition. On exploration the mass was found to be caused by the induration following a chronic ulcer. A gastro-enterostomy was performed, and the patient since that time has steadily improved and gained in weight, and all gastric symptoms have disappeared. Had not this case been operated upon, the case might have been put aside as one of malignancy, and the patient would gradually have worn himself out as the result of the chronic irritation about the pylorus, due to an old ulcer. Dr. Harte feels convinced that many of these cases of presumable malignancy can be greatly benefited by operation, and would advise in all doubtful cases that an exploratory operation be performed; if conditions are such as to indicate a posterior gastro-enterostomy, it should be performed.

TRANSACTIONS

OF THE

CHICAGO SURGICAL SOCIETY.

Stated Meeting, April 4, 1904.

The President, E. WYLLYS ANDREWS, M.D., in the Chair.

METAPNEUMONIC EMPYEMA.

DR. ARTHUR DEAN BEVAN showed a young man who gave a history of pneumonia and a metapneumonic empyema. A rib had been resected and an empyema of the left side drained eight months before by another surgeon, after which the opening closed. This was followed by a reaccumulation of the fluid, and when Dr. Bevan saw the patient the entire left side of the chest was full of pus up to the clavicle, and the apex beat was in the middle line. There was a small discharging fistula in the third intercostal space two inches to the left of the sternum, and through this a probe could outline the entire cavity. The patient was septic and in bad condition. An extensive U-shaped incision was made and the soft tissues lifted up. A resection was made from the third rib to the tenth inclusive. This was done subperiosteally. After lifting up the very large flap, and after the resection had been made, all of the intercostal tissues, including the pleura, which was three-quarters of an inch in thickness, were cut away with strong scissors. The U-shaped flap was then drawn down and a tube as large as the thumb introduced to the apex of the cavity and the flap stitched in position. Some gauze was also packed in. The operation was done the 7th of January. The patient had some sepsis for a considerable period after the operation, about ten days; in other words, the temperature continued. However, this condition gradually improved. About four weeks after the operation, an outline of the cavity which remained

was obtained by injecting iodoform emulsion into the cavity, sealing the opening, and taking an X-ray picture. The skiagraph showed a fine ribbon-like cavity which reached almost to the clavicle. The patient was then put at work blowing up an air-bag. Every day, as he blew up the air-bag, expansion of the compressed lung was effected by the forced expiration used. As a matter of fact, there was apparently no lung tissue on the left side at the time of the operation. Now, there was a fair amount of lung tissue occupying the upper left apex. The entire wound had healed. Patient was now practising gymnastics, and his general condition was excellent.

Dr. Bevan stated that this was the seventh or eighth Schede operation he had done, and it was the most satisfactory one of the entire group. He thought the excellent result was due primarily to two facts,—very extensive resections of the ribs, including the pleura, which latter he had omitted in some of his cases, and to the use of an air-bag, as stated, to expand the lung at the apex. In most of his previous cases he had failed to obliterate the cavity at the apex, or else it had required a long time to accomplish it.

He showed three skiagraphs, one showing the case before the operation; the second when there was still a ribbon-like cavity containing iodoform emulsion, and a third showing the case as it was to-day completely cured.

CERVICAL RIB.

Dr. D. N. Eisendrath showed a skiagraph from a patient, fifty-six years of age, who had consulted him on account of recurrent hæmorrhages apparently from the lungs. During an examination of the chest, while palpating above the left clavicle, a hard mass about the size of a fist was detected. Careful examination showed this to be a cervical rib. An X-ray picture taken showed well the cervical rib.

Dr. Eisendrath stated that there were four types of these cases,—one in which the cervical ribs were complete and articulated with the sternum; the second type, in which they were usually from three to four inches in length, and articulated with the first thoracic rib, or with the sternum by means of a ligament, and two other forms in which they were rudimentary, one being

about an inch in length, and a fourth, in which the cervical rib was simply a tubercle projecting from the transverse process.

As regards the origin of this cervical rib, the only way one could understand it was to consider it as a reversion of type of the mammalia towards some of the elementary forms. This cervical rib existed in reptiles. It must be regarded as an abnormal development of the anterior nucleus of the transverse process of the seventh cervical vertebra.

PSEUDO-ATLANTO-AXOID DISLOCATION.

DR. EISENDRATH presented skiagraphs which were important from a medicolegal stand-point.

During the month of December, there was tried in a Chicago court the case of a young woman who had alternating attacks of paralysis of the lower extremities, attacks of blindness, paralysis of the left upper extremity, and who claimed to have sustained an injury as the result of being pulled up on to a car platform by a conductor. The case seemed to be one of pure hysteria, but two X-ray pictures were exhibited by her lawyer, which apparently showed a dislocation of the atlas upon the axis. The speaker was called in the case as an expert, and after having been shown the skiagraphs gave as his opinion that the case was a sham, and in order to prove that this was not a dislocation of the atlas upon the axis, he had an X-ray picture taken of his own spine.

The first skiagraph he presented showed the normal spine where the atlas rests upon the axis. The second picture he had taken with his head in the same position as that in which the skiagraph of the woman's head was taken, the head stretching forward, and he thought, unless this skiagraph was labelled, it would be mistaken for a dislocation of the atlas upon the axis. It hardly seemed possible that a normal human being could produce such a dislocation. However, it was one of the great points of contention in the case, in that it was simply shown what could be done by the normal human spine. He thought this was simply the beginning of the possibilities of studying practical normal skiagraphs.

ADENOMA OF THE MUCOUS GLANDS OF THE LIPS AS A CAUSE OF MACROCHEILIA.

DR. D. N. EISENDRATH read a paper with the above title, for which see page 320.

RESULTS IN ABDOMINAL WALL SUTURE.

Dr. Charles Davison read a paper with the above title, for which see page 373.

Dr. A. J. Ochsner said there were three elements which must be considered in the closure of abdominal wounds. The first one was accurate coaptation; second, an aseptic wound, and, third, the absence of pressure necrosis. He thought all of these elements were taken care of by the method that had been described. The method made it necessary to have the layers distinctly in view, because the suturing could not be accurate unless one had these layers in mind.

Silkworm gut was easily rendered aseptic, and it was almost impossible to make it septic during an operation. The fact that one had a long silkworm-gut string, which passed in and out, made pressure necrosis impossible, because it did not definitely constrict any given point of tissue.

It was foolish for one to say anything about one's personal experience with postoperative hernia without having followed all of his cases, so that he would not say what could be expected in this regard. But he knew that if these three conditions were carried out, it did not make much difference what suture material was used, or what particular method one employed, one would not get postoperative hernia.

Last year he had approximately 740 abdominal sections, and of this number he did not believe there would be a ventral hernia in any case in which the three principles referred to were employed.

Dr. D. N. Eisendrath had seen the method of Dr. Davison used very satisfactorily. Personally, he had had practically no experience with it other than to assist in some operation in which it had been employed. To one point he would like to call attention. From the umbilicus downward, practically the anterior sheath of the rectus was made up of the aponeurosis of the three muscles, so that if these were pulled together tightly it was the greatest factor in the prevention of hernia. The point that seemed difficult in Dr. Davison's method was how the sutures could be pulled out afterwards, especially the deeper ones, say, in a case of umbilical hernia. He asked Dr. Davison whether he had experienced any difficulty after ten or twelve days had elapsed in unloosening the pseudo-knot and removing the sutures. The

subcutaneous suture enabled one to get the most beautiful line of union in the superficial lines except at the ends of the wound.

Dr. Wm. M. Harsha said he had used Dr. Davison's suture in probably twenty or more cases. There had been no hernia in any case that he had been able to follow up; but the skin cicatrix had spread in some cases. There had apparently been no giving way in the fascia, so far as he could tell, or in the peritoneum. In fat patients, in cases where the layer of adipose tissue is quite thick, while the belly of the muscle came together between fascia and peritoneum, the fat did not seem to bulge out, and the skin in some cases had stretched over. This had been one difficulty he had seen in the cases he had operated upon by this method. He had had no case of infection. By this method it made the neatest and nicest scar when one took the sutures out.

Dr. C. C. Rogers had used the Davison suture in eighteen cases, five of them being emergency cases, the others hospital cases, with one case of infection. This patient recovered in five days after the removal of the stitch. In thirteen cases there had been no hernia, so far as he knew; the others he had not seen or heard of recently. He had had no difficulty in removing the stitches. To prevent spreading of the scar of the skin referred to, in fat subjects, where the abdominal fat was thick, he inserted an extra stitch, suturing the fat together with a continuous stitch and bringing out the ends, as the skin and peritoneum were stitched, in that way obviating any dead space.

Dr. Carl Wagner said he had used the longitudinal wire suture in several cases, but had abandoned it on account of the wound in two cases having opened. He thought the wire was too stiff, and that silkworm gut was preferable, in that it was much smoother and more elastic.

Dr. E. Wyllys Andrews said that one virtue of the longitudinal silkworm-gut stitch lay in the fact that it was semirigid and semiflexible, becoming moulded to the tissues and not stretching. With regard to the subcuticular stitch, he had used it in hundreds of herniotomies. In the case of a long incision, for example, like that posterior to the sternomastoid muscle in an operation on the glands of the neck, it was better not to insert the subcuticular stitch in one long piece, because, when one came to remove it, it would break so easily. The late Dr. Fenger had taught this. He had found it out in his own experience. One

should begin at the ends and make the two pieces meet, so as to draw it out in two parts. He thought wire had the same rigidity combined with flexibility as gut, and greater strength for the same diameter. The secret of getting out these wires easily afterwards lay in one step of the technique, which was this: As soon as one had finished the stitch, he should grasp the two ends of the wire strongly and seesaw it as he would with a chain-saw. This straightened the wire, so that it did not look like a wavy line, but a straight line, and the tissues became a wavy line. The wire was perfectly loose in the tissues, just like a harelip pin, when two weeks after its insertion one pulls it out straight.

DR. DAVISON, in closing the discussion, said that credit should be given to Halsted, of Baltimore, as the originator of the subcuticular stitch. The first he knew of the longitudinal stitch being used was from a description of it by Haughey, of Ann Arbor, in 1896. At about the same time Haggard, now of Nashville, but at that time an interne in a New York hospital, used it, failed to get it out, and quit its use. The only thing he claimed which was original with himself was that he used the knot which fastened the silkworm-gut suture in position. Every other element of it had been in use for a long time. With silver wire one could not tie a knot and get the wire out again without breaking it. He experimented carefully for a year with many cases without a knot, and while the majority of them were all right, every once in a while the suture would pull out, thereby causing the wound to spread.

Silkworm gut was elastic and tended to straighten itself. If it were allowed to remain in the tissues for, say, two weeks, it would produce a microscopical area of pressure necrosis around it, which made it easy to remove. There were three elements which interfered with getting a silkworm-gut suture out: (1) Imperfect silkworm gut. If one used silkworm gut that had been treated with chemicals in its sterilization, it was likely to fray, and it would catch and split. He obtained the best selected strands of silkworm gut he could procure, the largest, strongest size Spanish silkworm gut. One should be careful to get gut that was strong, perfectly round and smooth, so that there would be no catching, not treated by chemicals at all, but simply boiled previous to operation, which made the strands soft and pliable like a string. (2) The next defect was back stitching. In working

in a deep wound, if one was not careful he would back stitch in going from side to side in the fascia. If this was done, one had to break the gut at that point to get it out and remove it in two parts. (3) The position of the patient when the sutures were being removed. When the patient lay on his back, as one frightened him in removing the stitches, he made tense all the abdominal muscles and interfered with the removal; whereas, if the shoulders were elevated on the pillow, the legs and thighs flexed, the abdominal muscles were relaxed, and the stitches could be removed more easily. Usually he cut the stitch off an inch longer than necessary, for the reason that in case it should break off he had something to pull it from the other side, cleansing it each time before attempting to pull it out. He rolled the proximal end on a gauze sponge and artery forceps; he bit on the covered strand, rolled the sponge and strand around the artery forceps, and when the patient was in the right position he held the artery forceps just like a cork-screw and made gradual traction, thus removing the sutures.

As to widening of the scar, he had been operated on for appendicitis himself; this stitch had been used, and he had had ample opportunity and chance to examine it. If there was much fatty tissue, there would be absorption of the superficial part of the skin, and perhaps widening of the scar, but this absorption would occur in the injured part of the cuticle. If there was fat of any consequence, he would put in an extra stitch through the fat back and forth, which would obliterate a dead space, so that there was no chance for blood to accumulate. If blood did accumulate, each strand acted as a capillary drain, draining the blood into the dressings.

In all of his series of operations he had never had to tie an artery in the abdominal wall; he had always succeeded in arresting hæmorrhage by torsion or by pressure of one of the sutures.

As to long abdominal incisions, if he were to make an unusually long abdominal incision, he would insert the sutures in sections, making of them complete sets as if there were separate wounds, not to put any great length of silkworm gut in a single wound. He had made the sutures four, five, and six inches long and removed them without any trouble.

He wanted to say, again, that the only claim of originality he made was the use of the knot which fastened the longitudinal suture in position.

RESECTION OF FOUR FEET OF SMALL INTESTINE FOR PERFORATION OF THE UTERUS DURING CURETTAGE.

Dr. William Hessert said that the case whose report follows is of such an unusual nature that its publication is deemed justifiable. Perforation of the uterus during curettage is an accident which occurs not infrequently, but the reports of cases are obviously not found in the literature. It has occurred not only in the hands of the novice, but even the more expert have at times committed this blunder, not to mention the many fatalities in the hands of midwives, or where the wound was self-inflicted by the woman. All with any experience with curettage for incomplete miscarriage can testify that sometimes unusual care is necessary to avoid perforating the thin, soft uterus. A curettement at all times, but especially of a pregnant uterus, is an operation which should demand the greatest care. It should be preceded by an accurate anatomic and pathologic diagnosis of the pelvic condition, and its performance guided by the carefulness and judgment which come with experience.

The patient, a woman of forty-six years, and the mother of five children, had a miscarriage, and curettage, one year ago. She had become pregnant again, and had an incomplete miscarriage at the third month. She was attended by a midwife, who called her regular family doctor on account of hæmorrhage. The doctor attempted to empty the uterus without an anæsthetic, but found this impossible, so he packed with gauze. Next morning the patient was put under an anæsthetic at her home, for curettage. Her general condition was good, and there was only a slight rise of temperature. A pair of Goodell cervical divulsers was introduced into the cervix and the blades separated. After accomplishing what seemed sufficient dilatation, the blades were withdrawn and a placental forceps introduced. Something soft and slippery was felt in the grasp of the forceps, which was supposed to be membranes and placenta. After some traction and twisting, a mass of material was delivered on the towels outside. On closer inspection it was found to be a two-foot loop of small intestine. The gut was then hastily pushed back in the direction from whence it came, and after tamponnade of the vagina further operating was deferred.

The writer saw the case in consultation in the afternoon,

about four hours after the above incident. The woman had recovered from the effects of the anæsthetic. Her general condition was fair; pulse 120, of fair quality, but somewhat intermittent; temperature 101° F. She complained of no pain, only felt weak. Heart and lungs negative. Abdomen soft and not distended, and examination was negative save for some slight tenderness in hypogastric region. Urine negative. The packing in vagina was not disturbed. On the basis of the history, an immediate laparotomy was demanded, and the patient removed to the hospital.

Operation.—Seven hours after first operation. Abdomen and external genitalia carefully prepared, including vagina, from which tampon was removed. No gut seen protruding from cervix. The latter was large and patulous, but presented nothing abnormal in appearance. Median incision above pubes. About two ounces of fresh blood-clot in pelvis, but no active bleeding anywhere. A loop of small intestine was lifted out from pelvis; it was completely detached from its mesentery. All the detached portion of intestine, together with the mesentery, was now delivered outside of the abdomen. One loop of gut entered a small rent in the anterior surface of the uterus. On making slight traction this portion was pulled out. On surveying the damage, it was revealed that the gut for a distance of over three feet was completely severed from the mesentery, no portion of the latter being adherent to the gut. The latter was separated from its mesentery as clean as one does in the post-mortem room. There was, of course, an absolute indication for resection, as this section of intestine was completely deprived of its blood supply.

The intestine was not distended; it was somewhat dull and livid, and presented some hæmorrhagic areas here and there. There was no perforation.

A typical end-to-end anastomosis was done, using the Murphy button. Four feet of intestine were removed. The free end of mesentery was trimmed, the larger vessels ligated with catgut, and the free edge brought together with a running catgut suture. Pelvis swabbed clean of clots, there being no escape of fæcal matter. The uterus was retroflexed and about the size of one's fist. On the anterior surface, midway between the internal os and the fundus, there was a transverse opening, two and one-half centimetres long, just large enough to admit the index-finger. The false passage led diagonally through the wall of the

uterus, terminating at the internal os, this being also the point where the direction of the cervical canal took its backward dip. Cavity of uterus explored with finger, and no placental débris detected. It was practically empty. With a curved dressing forceps a strand of iodoform gauze was inserted into the false passage, so that it would emerge into vagina. The other end of the gauze was then packed into the uterine cavity. The wound in uterus was now closed with three deep catgut sutures. There being no other injuries, the abdomen was closed in the usual manner, without drainage. A gauze tampon inserted into vagina, and one litre normal salt infusion given by infusion.

Patient left the operating room in fair condition; pulse 130.

Subsequent History.—There was little shock following the operation, but the patient was given another litre of saline solution per infusion the same night. For several days the pulse was irregular, but finally became regular and the rate about 100. Temperature did not rise over 100° F. Small amount of bloody flow for a few days. Tampon and uterine drain removed on third day, and not reinserted. Liquid diet, but no milk allowed. Bowels moved spontaneously on second day, and every day after, by enema, if necessary. Suture removed on eighth day; healing by primary union. Button passed on tenth day. Left hospital after three weeks, entirely well, although somewhat weak.

CARCINOMA OF THE HEAD OF THE PANCREAS.

DR. HESSERT showed a specimen of carcinoma of the head of the pancreas. The history of the case as given briefly was as follows: The woman was seventy years of age and had been previously healthy. She was seen four months ago on account of jaundice. The latter for several weeks was mild, and there were scarcely any other symptoms. Stools clay-colored, bowels costive; no pain, and never any pain previous to present illness. Examination of abdomen negative. After four weeks' duration the jaundice had deepened, there was considerable itching, diminished appetite, and general weakness. Examination showed liver to be somewhat enlarged and generally tender. No tumor could be made out; urine contained bile and small amount of albumen. After six weeks' duration of the trouble there was still no subsidence of the symptoms, as might be expected in an ordinary case of catarrhal jaundice. Furthermore, the liver was still more

enlarged, and he thought that he could feel a mass vaguely deep in the right hypochondriac region. The question of malignancy arose, and he called Dr. Favill in consultation. The diagnosis lay between gall-stones, catarrhal icterus, and cancer. The utter absence of pain spoke against gall-stones; the clinical course pointed to a graver disease than catarrhal icterus; a diagnosis of probable malignancy was made.

The day following the consultation the stools became bile-stained again, and patient felt somewhat better.

The patient gradually became worse, the icterus was intense, and the usual cachexia finally ended in death four months after onset of symptoms. It is noteworthy that there was never any pain until near the end, and then not severe.

During the last month or two the ascites and enlargement of the liver made deep palpation impossible. The itching had also entirely subsided.

At the autopsy, exploration was first made with the hand; the distended gall-bladder contained no stones, and none could be felt in the common duct. He was surprised not to find a large tumor mass, and the only feature palpable was what appeared to be some hardening and enlargement of the head of the pancreas. The duodenum felt normal. When this is compared with the later findings, it is evident that in the performance of an exploratory operation a tumor such as this one might easily be overlooked. The liver, pancreas, and duodenum were removed *in toto*. The former was greatly enlarged and the gall-bladder much distended, as were also all the ducts. The head of the pancreas was enlarged to twice its natural size, and was indurated. On cutting open the duodenum there presented at the site of the papilla a cauliflower-like mass the size of a half dollar. It was elevated one centimetre above the surface of the gut, and was somewhat hard in consistency. Its summit was eroded. On making considerable pressure on gall-bladder, a small amount of bile exuded from an opening in the centre of the mass. A small probe here inserted was caused to enter the common duct. A microscopical examination had not yet been made, as the specimen was preserved intact for gross demonstration. There were no stones.

APPENDICITIS, WITH PERFORATION OF THE DUODENUM.

Dr. D. W. Graham reported the case of a man, aged thirty-seven years, who was admitted to the hospital June 12, 1903. Four years before, he had had a sudden severe attack of pain in the upper right quadrant of the abdomen, with fever, nausea, and vomiting, on account of which he was bedfast ten days. Since then there had been three or four similar but less severe attacks. On admission he gave the history of another attack, beginning three weeks before. Temperature, 102° F.; marked rigidity and pressure pain over right hypochondrium. The pain and nausea had noticeably diminished three days before, coincidently with an attack of diarrhœa. There were not now, nor had there been at any time, distinctive symptoms referable to the gall-bladder or the kidney. There was no tenderness over the cæcum. The diagnosis was suppurative inflammation of uncertain origin, but probably connected with the gall-bladder or an abnormally placed appendix. Operation the following day. The usual gall-bladder incision revealed the gall-bladder practically normal and free from stones, but inflammatory adhesions of all the neighboring viscera were found. Following the lines of cleavage pus was discovered well back towards the posterior abdominal wall. From one to two ounces were removed by sponging as it appeared. There was nothing in the pus or the abscess cavity that would indicate the cause of the suppuration. A large counter-tubular drain was made through the loin, with the inner end of the tube in the abscess cavity. The operative wound was closed without drainage. On the following day the discharge through the lumbar drain became profuse and contained bile. It was soon discovered that fluids taken by the mouth would shortly appear in the dressings with large quantities of bile. On the third day, the patient not doing well, the operative wound was opened, some pus found, and drainage established. The patient died on the tenth day.

In the autopsy the appendix measured eleven centimetres in length and was found to pass directly upward behind the ascending colon, its free end being adherent to the psoas muscle and lying behind the curve of the duodenum and attached to it. Six centimetres from the pylorus, and on a level with, and three centimetres to the right of, the biliary papilla was a perforation of the posterior duodenal wall three millimetres in diameter.

The specimen presented showed the relation of the appendix

to the colon, the abscess cavity, and the duodenum. The tip of the appendix, which is bulbous, shows a small perforation, and it forms a part of the abscess wall. The lumen is pervious throughout, and is free from fæcal concretions. The relations and position of the duodenal perforation are also well shown.

These findings account for and explain everything in the history of the case, both before and after the operation. When bile and other liquids began to appear in the drainage, perforating ulcer of the duodenum was suspected as the primary lesion. The patient died of suppurative peritonitis, though the infection was limited to the area between the liver and the original focus. The use of the lumbar drain in this case was correct, although in a similar one he would drain through the operative wound as well.

AMŒBIC ABSCESS OF THE LIVER, WITH COMPLICATION.

Dr. Graham also reported the case of a man, thirty-seven years old, who had never been out of the State of Illinois, a free drinker of whiskey for years, who was admitted to the hospital October 26, 1903. Present trouble began July 19, while walking in the street, with a severe pain in the epigastrium followed by a chill, high temperature, and diffuse abdominal pain. Five weeks later the pain became localized about the right costal arch, and especially marked on deep respiration. He has had no jaundice and no tarry stools. No appetite. Has lost sixty pounds. On examination the liver was found much enlarged, with a friction sound caused by the respiratory movements. The daily temperature ranged from 98° to 103° F. The leucocyte count at this time was 11,000; two weeks later, 15,500. A few days after admission, large quantities of pus appeared with the fæces, with amelioration of the symptoms. This continued for three days. The patient came into his care through Dr. Sippey with the diagnosis of suppuration in the liver. Operation, November 5. The under surface of the right lobe of the liver was very much swollen, projecting forward and downward, and adherent to the colon. Two quarts of pus were removed. Large tubular drain with packing. The pus was sterile so far as could be determined by repeated microscopical and culture tests. No amœbæ could be found in the stools either before or after the operation. Notwithstanding the free discharge of pus which continued, the patient did well for a week following the operation. Then the

sutures of the abdominal wound were cut out and the borders began to slough. In spite of two radical attempts to arrest it by the free use of the knife, scissors, and curette, besides the continued use of the usual antiseptics, the sloughing persisted, and the patient died of exhaustion the thirty-second day after the operation. The sloughing wound extended from Poupart's ligament up onto the chest wall and was eight inches in width. Except at the upper part of this area the peritoneum remained intact. Cultures from the sloughing borders showed only staphylococci and streptococci.

The specimen shows (1) the large sloughing wound of the abdominal wall, which has been preserved intact; (2) the adhesion of the liver to the colon, which represents the point where the abscess was partially evacuated through the colon wall before the operation; (3) the abscess cavity in the liver as large as the fist, notwithstanding the contraction that has taken place; (4) many small abscesses through the liver; (5) numerous ulcers in the mucosa of the colon, with sloughing undermined edges and intercommunicating by channels underneath the mucosa, having all the characteristic features of amœbic ulceration.

The special interest in this case centres in two points, namely, the cause of the abscess and the complication.

While amœbic abscess of the liver is common enough in Southern climates, it is rare for the affection to originate in this latitude. As to the complication, the progressive melting away of the abdominal wall under the influence of ordinary infection, notwithstanding its accessibility and the ease with which the infection could be subjected to every available means for combating it, shows to what extreme degree the tissues may lose their power of resistance from systemic debility.

REVIEWS OF BOOKS.

VON BERGMANN'S SURGERY. A System of Practical Surgery. By DRS. E. VON BERGMANN, of Berlin; P. VON BRUNS, of Tübingen, and J. VON MIKULICZ, of Breslau. Edited by WILLIAM T. BULL, M.D., of New York. Volumes II and III. Philadelphia: Lea Brothers & Co., 1904.

The first volume of this system of surgery has recently been reviewed in the ANNALS OF SURGERY. The first volume dealt with the Head, the second deals with the Neck, Thorax, and Spinal Column, and the third considers the Surgery of the Extremities.

The list of contributors to the second volume contains the names of v. Angerer, v. Bruns, Erhardt, v. Eiselsberg, Henle, Hofmeister, Jordan, Kümmell, and Riedinger.

In Volume II, von Eiselsberg contributes the chapter on Diseases and Injuries of the Thyroid Gland, which constitutes one of the best treatises of the book. It is not explained why the authorship of the chapters on Malformations, Injuries, and Diseases of the Neck, Larynx, and Trachea, and Mammary Gland is not given, an omission which detracts from the value of the work. For instance, v. Bruns's name is given as one of the contributors to the volume, but the chapters he wrote are not designated. Some of the anatomical plates, which are beautifully reproduced, bear no explanatory texts.

In Volume III Hoffa's contribution on Malformations and Injuries of the Hip and Thigh is one of the most important in this volume. He presents very fairly the methods and surgical procedures of other surgeons, such as Lorenz, Mikulicz, Schede, and others, at the same time expressing his own conclusions on the subject. His chapter on Congenital Dislocation of the Hip-Joint is excellent. The section on Amputation at the Hip-Joint by the

same author is remarkably poor and incomplete. The method of Wyeth, so successfully and extensively used by American surgeons, is not even described, but is simply mentioned in passing as a complicated and unnecessary procedure.

In this volume many X-ray pictures are reproduced, and add greatly to the value of the work. Rarely is the old schematic drawing seen.

The general arrangement of the work is excellent.

PAUL M. PILCHER.

ORTHMANN'S HAND-BOOK OF GYNÆCOLOGICAL PATHOLOGY. Translated by C. HUBERT ROBERTS, M.D. (Lond.), F.R.C.S. (Eng.), M.R.C.P. London: John Bale, Sons & Danielsson, Ltd., 1904.

This work, which is a translation from the German, is intended to assist the gynæcologist in making his own microscopical diagnoses. The first section of the book is given to a brief description of the most modern methods of general pathological technique. The remainder deals with the diagnosis of pathologic conditions of the various parts of the female generative tract. The descriptions are as concise as thoroughness will allow, and the uncommon conditions are only briefly considered. The chapters on New Growths of the Uterus and affections of the Fallopian tubes are especially instructive. The text is interspersed with seventy-three excellent illustrations, mostly all original. The book is a valuable contribution to the literature of gynæcological pathology.

WALTER A. SHERWOOD.

ELEMENTS OF SURGICAL DIAGNOSIS. By A. PEARCE GOULD, M.S., F.R.C.S. Third edition, revised and enlarged. Chicago: W. T. Keener & Co., 1903.

In this new edition the whole text has been revised and many additions have been made. A section on the Diagnosis of the

Intracranial Complication of Middle-ear Disease has been added to the chapter on Diseases of the Head, and the chapters on the Diagnosis of Abdominal Diseases have been considerably enlarged.

In its scope, the book covers the entire field of the diagnosis of injuries and surgical diseases of the body, the two being considered separately. There are no illustrations and the print is small. The arrangement of the text is somewhat confusing, owing, no doubt, to the condensed form in which the subject is presented, and the fact that the direct and the differential diagnosis are not clearly enough defined.

The book contains a wealth of valuable information and is thoroughly practical.

PAUL M. PILCHER.

CASE TEACHING IN SURGERY. By HERBERT L. BURRELL, M.D., and JOHN B. BLAKE, M.D. Philadelphia: P. Blakiston's Son & Co., 1904.

In this small volume are detailed the salient features in the histories of seventy-five selected surgical cases. On the page opposite each history is left a blank space, in which the student is expected to supply the diagnosis, prognosis, and methods of treatment. The idęa is a good one, and should prove to be a valuable aid to instructors as a means of assisting them in didactic and clinical instruction.

WALTER A. SHERWOOD.